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The current study examined classroom emotional climate as a moderator of anxious solitary children's risk for peer exclusion over a three-year period from third through fifth grade. A sample of 688 children completed peer nominations for anxious solitude and peer exclusion in the Fall and Spring semesters of each grade, and observations of classroom emotional climate were conducted at the same timepoints. Cross-classified growth curves with Poisson distributions were computed using hierarchical linear modeling. Results supported the child × environment model and provide evidence that elementary school classroom emotional climate has concurrent by not long-term effects on anxious solitary children's peer adjustment in later middle childhood. Current results suggest that supportive classroom emotional climates have protective effects on anxious solitary children by Spring semesters across all grades. Results suggest that teachers who are able to provide supportive classroom environments can decrease levels of peer exclusion in their classrooms.

ELEMENTARY SCHOOL CLASSROOM EMOTIONAL CLIMATE AS A MODERATOR OF ANXIOUS SOLITARY CHILDREN'S RISK FOR PEER EXCLUSION: A CHILD × ENVIRONMENT MODEL

by

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To my patient husband, whose selfless love and support made my success possible; and to my parents, who taught me to chase after my dreams.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

Although proximal familial (Early et al., 2002; Rubin, Burgess, & Hastings, 2002) and distal cultural (Chen, Rubin, & Li, 1995; Chen, Rubin, & Sun, 1992; Hart et al., 2000) environmental factors have been examined as moderators of peer adversity among anxious solitary children (i.e., those who have social evaluative concerns and exhibit social anxiety through shy, inhibited, solitary behavior; e.g., Gazelle & Ladd, 2003), little is known about the proximal environment in which children's peer interactions take place: the classroom. Current conceptualizations of classroom influences on anxious solitary children's peer adjustment are limited because they have yet to take into account (1) effects beyond early middle childhood or (2) longitudinal effects within and across grades.

A recent study (Gazelle, 2006) provides evidence that early childhood anxious solitude and unsupportive classroom emotional climate interact to produce negative peer adjustment for children entering elementary school. However, older age groups have been largely ignored. Specifically, it is unclear whether the same effects of the classroom environment that occur for children as they enter this new environment and begin exploring peer relations would occur for older children after peer relationship have been better established. It may be that this early transitional stage when entering elementary school may have a large impact as children are exploring their social environments and beginning to form peer relationships but that subsequent classroom experiences are less influential after these relationships have formed. However, it is

also possible that the classroom context influences children's peer relations at older ages as they develop more stable relationships with peers.

Because no research has examined the influence of the proximal classroom emotional climate on anxious solitary children's risk for peer exclusion (i.e., directly or indirectly leaving peers out of interactions; Gazelle & Ladd, 2003) longitudinally as they interact with the same classmates over the course of the year (within grade) and across grades as they interact with different classmates over transitions across several grades, the current study aims to investigate these effects. It is particularly unclear whether the classroom environment produces long-term (i.e., across grades) or concurrent (i.e., within grade or Fall to Spring semester) effects. Effects of the classroom environment may be particularly salient for anxious solitary children because anxious solitude can be viewed as an individual characteristic that leads children to be vulnerable to stressful environmental situations. Because children's anxious solitude can interact with stressful environmental situations (i.e., emotionally unsupportive classrooms) to produce positive or negative peer relations (e.g., peer exclusion), the current study examined this interaction with a child × environment model.

The Child × Environment Model

The child × environment model (e.g., Magnusson, 1988; Magnusson & Stattin, 2006) has recently been applied to the examination of the dynamic interaction between anxious solitude as an individual affective-behavioral profile and interpersonal situations and environments, such as difficulties with peers and emotionally unsupportive classrooms (e.g., Gazelle, 2006; Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004). Before these recent studies, most research examined transitory situations that influence anxious solitary children's behavior, such as unfamiliar contexts or highly evaluative situations (Cheek & Busch, 1981; Crozier, 2001). Because the

majority of previous research has focused on these transitory situations, little is known about characteristics of the stable, daily environments that influence anxious solitary children's peer adjustment over time. Specifically, children spend the majority of their day with classmates at school and this is a primary context in which peer relations take place. Therefore, examining peer relations that may be influenced by the classroom context is necessary to determine how this environment moderates peer adjustment.

In the current study, the child × environment model is utilized to conceptualize the child as nested within the classroom environment. Specifically, children's individual anxious solitude is proposed to interact with the emotional climate of the classroom, which may influence these levels of peer exclusion among classmates. Each of these constructs will be discussed in turn, beginning with the two levels that are expected to interact to produce changes in children's levels of peer exclusion—individual characteristics (i.e., anxious solitude) and proximal environmental influences (i.e., the classroom emotional climate).

Anxious Solitude

Anxious solitude is characterized by shy, verbally inhibited, and reticent behavior (i.e., onlooking and unoccupied solitary behavior) among familiar peers (e.g., Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004). These behaviors are conceptualized as manifestations of an internal conflict between normative social approach motivation and high social avoidance motivation (Asendorpf, 1991; Coplan, Rubin, Fox, Calkins, & Stewart, 1994; Stewart & Rubin, 1995). This motivational conflict occurs when children desire interaction with peers but, paradoxically, avoid them due to fears of poor social performance and negative peer treatment. These feelings prompt children to place themselves in the proximity of peers but then make no attempt to join into their activity (i.e., onlook or watch other children play without attempting to join in). Therefore, this

onlooking behavior is considered to be a hallmark of anxious solitude. In other research, the terms "conflicted shyness" and "anxious withdrawal" have been used to identify similar characteristics (e.g., Coplan, 2000; Coplan et al., 1994; Rubin & Asendorpf, 1993). These terms are synonymous with anxious solitude, although the term "anxious solitude" is preferred because it is more concrete and descriptive of both children's internal motivations and observable behaviors.

The child × environment model (e.g., Magnusson, 1988; Magnusson & Stattin, 2006) is particularly useful for describing anxious solitary children's social adjustment over time because their peer adjustment is influenced by both individual and environmental factors. Specifically, anxious solitary children are conceptualized as at-risk for poor peer adjustment because they bring vulnerability to social situations. Although anxious solitary children display difficulties in interpersonal situations on average, they also display a great deal of heterogeneity in their adjustment trajectories, with some having significant difficulties with social relationships, whereas others adjust relatively well over time (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004; Oh, Rubin, Bowker, Booth-LaForce, Rose-Krasnor, & Laursen, 2008). Because the majority of research has focused on anxious solitary children's adjustment on average, little evidence is available regarding the specific situational factors that predict divergent trajectories over time, such as emotionally supportive or unsupportive classrooms.

Classroom Emotional Climate

In past research, the classroom environment was considered merely the aggregate number of children displaying certain characteristics within a classroom (e.g., classrooms with a large number of children displaying peer-reported misbehavior were considered to have a negative climate; Neckerman, 1996; Werthamer-Larsson, Kellam, & Wheeler, 1991). However in more

current examinations, the classroom environment is conceptualized as a function of both teachers and students as observed through dynamic interactions among each throughout the school day. The Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2003) was designed to classify classrooms (and children's experiences within these classrooms) in terms of two constructs: emotional support and instructional support. This framework focuses on the daily bidirectional interactions in the classroom, which are viewed as the primary mechanism through which children experience opportunities to develop social skills and academic competencies (Hamre, Pianta, Mashburn, & Downer, in press). Although research has found that classroom instructional and emotional support produce positive outcomes in terms of academic adjustment for at-risk children (Hamre & Pianta, 2005), the influence of these proximal environmental levels on children's social adjustment has rarely been explored. Although emotional and instructional support are related, the classroom emotional climate is expected to have a greater impact on children's peer relations because it refers more specifically to the social interactions among actors within the classroom. For this reason, only classroom emotional support is examined in this study.

Classroom emotional climate includes five broad constructs: positive climate, negative climate, teacher sensitivity, regard for student perspectives, and behavior management (Pianta, La Paro, & Hamre, 2003). *Positive climate* indicates the level of warm and pleasant attitudes among students, as well as pleasant interactions between teachers and children. *Negative climate* indicates the level of hostile atmosphere in the classroom, including aggressive, irritable and disrespectful attitudes between teachers and children. Ratings of positive climate and negative climate are not mutually exclusive, as the absence of positive climate does not imply the presence of negative climate. *Teacher sensitivity* reflects the degree to which teachers are responsive to

students' needs and students are comfortable seeking support from and sharing their ideas with their teachers and classmates. *Regard for student perspectives* indicates the degree to which teachers value students' points of view, autonomy, responsibility-taking, and interactions with peers. *Behavior management* reflects teachers' abilities to effectively prevent and redirect students' misbehaviors as well as to promote students' own resolution of peer disputes. Based on these five subscales, classrooms are coded for degree of emotional support. Emotionally supportive classrooms are characterized by interactions among teachers and students with a general positive tone and low conflict, whereas emotionally unsupportive classrooms are characterized by frequent disruption and conflict, as well as disorganization or overcontrol. Although emotionally unsupportive classroom climates pose a risk for poor social relations (i.e., maternal-reported internalizing behavior and poor social skills) for all children on average (NICHD Early Child Care Research Network, 2003), this risk may be particularly elevated for anxious solitary children, who may be especially sensitive to hostile environments and especially responsive to sensitive teacher support.

Anxious solitude appears to characterize some children's typical response to social situations; however, these behavioral patterns appear somewhat responsive to less threatening social environments (Gazelle, 2006; Gazelle, Putallaz, Grimes, Kupersmidt, & Coie, 2005). Results of a recent study (Gazelle, 2006) indicated that classrooms characterized by unsupportive emotional climates were particularly detrimental to anxious solitary children in early middle childhood. Specifically, anxious solitary children in unsupportive classrooms were more likely to experience peer adversity; in particular, boys were less accepted by their peers, and girls were more victimized and displayed more depressive symptoms. Interestingly, this risk diminished in emotionally supportive classrooms. These results suggest that classroom emotional climate can

either buffer or exacerbate the risk for anxious solitary children's negative interpersonal and social adjustment in early middle childhood. However, it is unclear how these environments may influence anxious solitary children's peer adjustment in later middle childhood.

These findings suggest that classroom emotional climate contributes to anxious solitary children's interpersonal adjustment at a single timepoint in early middle childhood, yet little is known about the influence of classroom emotional climate on adjustment longitudinally. In most American elementary schools, children are reshuffled to a new classroom with a new teacher and a different set of peers at the beginning of each school year. Over time, they are likely to experience classrooms characterized by various emotional climates (NICHD ECCRN, 2003). These yearly changes in emotional climate may affect children's current and subsequent peer relations. However, no research has explored these effects.

It is particularly unclear whether classroom emotional climate has long-term or concurrent effects on children. If long-term effects occur, as children transition from unsupportive to supportive classrooms across grades, the negative effects of an unsupportive classroom would permeate the next school year and make children less likely to experience the positive aspects of a subsequent emotionally supportive classroom. Long-term effects may be particularly salient for anxious solitary children, who may carry social anxiety and reticence into this new environment. However, it may also be likely that children are more influenced by their concurrent experiences in classrooms than by their past experiences in previous classrooms. Specifically, the classroom emotional climate from the previous school year may not have lasting effects on children as they transition into the next grade, but effects may be present within a grade (i.e., across Fall to Spring semesters). Therefore the impact of these environments on children's peer relations may be concurrent rather than long-term. Particularly for anxious solitary children,

transitioning into an emotionally supportive classroom may decrease their social evaluative concerns and ease their anxiety among peers after an initial adjustment to novelty. The current study aimed to examine whether the classroom environment produces long-term effects, concurrent effects, or both on anxious solitary children's risk for peer exclusion.

Peer Exclusion

Peer exclusion occurs when peers leave a child out of their activities (Gazelle & Ladd, 2003). Peer exclusion is defined by the actions of peers rather than the target child. Peer exclusion can occur through both direct refusals (e.g., saying "you can't play") and indirect actions (e.g., not choosing a child for a team or ignoring a child's attempt to join into a group; Gazelle & Ladd, 2003). Recent studies have found that anxious solitary children, on average, are at an increased risk for peer adversity (Gazelle & Ladd, 2003) and for later internalizing problems (Gazelle & Rudolph, 2004). It is important to note that, although anxious solitary children experience more peer exclusion than other children on average, they also display substantial heterogeneity in their experiences of peer exclusion (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004; Ladd, 2006). In other words, some anxious solitary children encounter peer exclusion soon after school entry and throughout middle childhood, whereas others do not encounter negative peer treatment (Gazelle & Ladd, 2003). The current study aims to investigate the classroom emotional climate as a contributor to these divergent trajectories.

The Influence of Classroom Emotional Climate on Anxious Solitary Children's Peer Adjustment

Although the influence of prolonged peer exclusion on experiences within the classroom is clear (e.g., disengagement from school, academic failure, and school avoidance; Buhs, Ladd, & Herald, 2006), the reverse—the influence of the classroom environment on children's experiences

of peer exclusion—has yet to be explored longitudinally. There are three possible mechanisms that may explain how peer exclusion is influenced by the classroom environment. First, in emotionally unsupportive classrooms, classmates may be allowed (if not encouraged) to treat peers negatively because these environments can be characterized by frequent criticism, sarcasm, or hostility from teachers and between students. Peer exclusion may be particularly likely to occur in classrooms that have little monitoring from the teacher and are chaotic or disorganized because children are able to mistreat their peers without immediate repercussions. Conversely, in classrooms with emotionally supportive climates, peers may be less likely to engage in peer exclusion, either because the teacher discourages this behavior or because students are more connected with one another and engage in positive interactions. Furthermore, if peer exclusion does occur in emotionally supportive classrooms, the teacher may be more likely to both notice and stop this behavior before it persists.

Second, peer exclusion and other forms of peer mistreatment are less likely to occur within the structured classroom setting than on the unstructured playground (Craig, Pepler, & Atlas, 2000). However, the classroom environment may influence children's behaviors at recess, where monitoring is less likely to occur because teachers are not directly involved in children's interactions. Specifically, unsupportive classrooms may set a social structure into place that would transfer to children's interactions at recess. Consequently, in emotionally supportive classrooms, peer exclusion may be less likely to transfer to the playground.

Third, the effects of classroom emotional climates on peer exclusion are likely to be observed for children in general, but these environments may be especially influential for anxious solitary children, who are at risk for difficulties in peer relations on average. Specifically, in classrooms with emotionally unsupportive climates, anxious solitary children's social evaluative

concerns may be exacerbated. Therefore, anxious solitary children in emotionally unsupportive classrooms may be more likely than other children to experience negative peer treatment, which may confirm their social evaluative concerns and cause them to experience increased social anxiety and other maladaptive outcomes (such as depressive symptoms and academic difficulties; Gazelle, 2006; Buhs, Ladd, & Herald, 2006). Conversely, this vicious cycle may not occur for anxious solitary children in classrooms with emotionally supportive climates, which may decrease their feelings of social anxiety when their social fears are not confirmed (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004). Although these mechanisms are the theoretical basis for the hypothesized impact of the classroom emotional climate on anxious solitude and exclusion, empirical evaluation of these mechanisms goes beyond the scope of the current investigation.

Gender Differences

Equal prevalence of anxious solitude among boys and girls is typically found in developmental literature (Coplan, Gavinski-Molina, Lagace-Seguin, & Wichmann, 2001). Additionally, the co-occurrence of anxious solitude and peer exclusion or victimization has been found for children of both sexes (Gazelle et al., 2005), although this relation appears somewhat stronger for boys in early middle childhood (Gazelle & Ladd, 2003). This result may occur because anxious solitude is a greater violation of male gender norms emphasizing self-confidence and dominance (Caspi, Elder, & Bem, 1988; Coplan et al., 2001). Furthermore, girls are more likely than boys to develop closer ties with their teachers (Howes, Phillipsen, & Peisner-Feinberg, 2000), so the influence of the classroom climate for girls versus boys may be somewhat stronger.

The Present Study

The current study aims to examine the extent to which the classroom emotional climate can moderate anxious solitary children's subsequent peer relations in later middle childhood.

Research on this topic has only examined the influence of the classroom when children are beginning elementary school. Therefore, it is unclear how the classroom environment influences anxious solitary children's peer relations beyond early middle childhood. Furthermore, the influence that dynamic changes in classroom emotional climate may have on children's peer relationships longitudinally in unknown: whether these effects are long-term (i.e., across grades), concurrent (i.e., within grade).

Hypotheses. The focus of the current study is to determine whether classroom emotional climate moderates anxious solitary children's peer adjustment, as well as to test two specific hypotheses regarding time effects: the long-term effects hypothesis (i.e., across grades or grade effects) and the concurrent effects hypothesis (i.e., within grade and Fall to Spring semester effects). It was predicted that classroom emotional climate would have both long-term and concurrent effects. It was also expected that effects of classroom emotional climate would be stronger in the Fall versus Spring semester because the effects of classroom emotional climate may be more salient to children as they transition to a new classroom and re-establish their place among a reshuffled group of classmates at the beginning of each school year.

It was expected that emotionally supportive classroom climates would predict decreases in anxious solitude and exclusion over time, whereas emotionally unsupportive classroom climates would predict increases in anxious solitude and exclusion over time. Furthermore, an interaction between anxious solitude and classroom emotional climate was expected such that anxious solitary children in emotionally supportive classrooms would have relatively low levels of peer exclusion. Conversely, it was hypothesized that anxious solitary children in emotionally unsupportive classrooms would have relatively high levels of peer exclusion. Although all children are likely to be affected by classroom emotional climate, anxious solitary children may

be particularly affected by this interpersonal context such that being in emotionally supportive classrooms may be particularly beneficial for them, whereas being in emotionally unsupportive classrooms may be particularly detrimental.

CHAPTER II

METHOD

Participants

Participants were 688 children with informed parental consent (*M* age at the outset of the study = 8.66 years, *SD* = 0.50) drawn from all 46 third grade classrooms in seven public elementary schools. Girls and boys were approximately equally represented (51.5% female (*n* = 354), 48.5% male (*n* = 334)), and the sample was diverse in regard to race/ethnicity (61.8% European American, 20.3% African American, 16.1% Latino, and 1.7% Asian American). The sample was also diverse in regard to socioeconomic status, with 29.8% of students receiving free or reduced lunch. Third grade children were selected because this grade-level corresponds to the first age at which there is evidence that peer sociometrics are reliable assessments of anxious solitude (Younger, Schwartzman, & Ledingham, 1985; 1986). Because hierarchical linear modeling provides the most accurate estimates when all available data is modeled including cases with missing timepoints, all children who completed measures in third grade were included in analyses. Of this sample, 564 children (82%) completed measures across two grades (either both third and fourth or both third and fifth) and 383 children (56%) completed all measures in third, fourth, and fifth grades. The current sample was a screening sample used for selecting participants for a longitudinal sample (*n* = 163) that completed additional measures. The screening sample participated in semiannual sociometrics and classroom observation assessments only. All children who were a part of the selected longitudinal sample were followed when they

moved to a different school. However, children in the screening sample were not followed in the event of a move. Therefore, the attrition rate for the screening sample was somewhat elevated.

Children who remained in the study (either with data at all timepoints or who were in the study in both third and fifth grade but not fourth grade; "persisters") did not differ from those who permanently left the study (either no data for fifth grade or for fourth and fifth grade; "dropouts") on any demographic variables. They did not differ in regard to age in the Fall semester of third grade (persisters M = 8.67 years, SD = 0.50, dropouts M = 8.66 years, SD = 0.50, t = 0.54, *ns*) or gender (persisters 49% male, dropouts 49% male, χ^2 = 0.01, *ns*). There was no difference in the rate at which they received free or reduced lunch (persisters 31%, dropouts 29%, χ^2 = 0.11, *ns*). The race/ethnicity of the incomplete sample is diverse and resembles the composition of the complete sample: European American (persisters 60%, dropouts 65%, χ^2 = 1.74, *ns*), African American (persisters 21%, dropouts 20%, χ^2 = 0.07, *ns*), Latino (persisters 18%, dropouts 14%, χ^2 = 2.41, *ns*), and Asian American (persisters 1%, dropouts 2%, χ^2 = 0.07, *ns*).

As noted in Table 1, attrition rates were highest between grades rather than within grades. Children were generally retained within a grade. This is because it was more likely that students moved to a different neighborhood and school in the summer than during a school year. Therefore, the only attrition that occurred within grade was due to the few children who moved between the Fall and Spring semesters.

Procedures

Peer nomination interviews were administered simultaneously to all participating children in each classroom in the Fall and Spring semesters of third, fourth, and fifth grade, for a

total of six timepoints. The percentage of participating children out of those eligible was 81 percent in third grade, 77 percent in fourth grade, and 76 percent in fifth grade. Each nomination question was read aloud to the class by a trained research assistant and then children selected classmates' names on their individual class rosters. Nominations were unlimited and cross-sex nominations were allowed because these procedures result in scores with superior psychometric properties (i.e., reliability, discriminant validity, and temporal stability; Foster, Bell-Dolan, & Berler, 1986; Terry & Coie, 1991). Children's scores on each item were equal to the total number of nominations they received. The analytic procedure used to control for variation in class size is described below in the Analytic Plan under the description of the Poisson regression.

Measures

Anxious solitude. An anxious solitude composite was comprised by summing the total number of nominations received for three items, with higher scores indicating higher levels of anxious solitude (range = 0-53 nominations, with the modal child receiving zero nominations) (α = 0.76 - 0.91): (1) "Some kids act really shy around other kids. They seem to be nervous or afraid to be around other kids and they don't talk much. They often play alone at recess. Who are the kids in your class who are shy and play alone a lot?;" (2) "Some kids watch what other kids are doing but don't join in. At recess they watch other kids play but they play by themselves. Who are the kids in your class who are shy and watch other kids but play alone a lot?;" and (3) "Some kids are very quiet. They don't have much to say to other kids. Who in your class is shy and doesn't have much to say to other kids?"

Exclusion. An exclusion composite was formed by summing the total number of nominations received for two items, with higher scores indicating higher levels of exclusion (range = 0-34 nominations per child, with the modal child receiving zero nominations) (α = 0.77 -

0.88): (1) direct exclusion: "When some kids ask if they can play, other kids say 'no' and won't let them play. Who are the kids in your class who can't play?" and (2) indirect exclusion: "Some kids get left out when other kids are talking and playing together. They don't get invited to parties or chosen to be on teams or to be work partners. Who are the kids in your class who get left out and aren't chosen?" Anxious solitude and peer exclusion were moderately correlated (r = 0.32 - 0.59 in the current sample), yet their divergent validity has been established with confirmatory factory analysis (e.g., Gazelle & Ladd, 2003; Spangler & Gazelle, 2009).

Classroom emotional climate. The Classroom Assessment Scoring System (CLASS; Pianta, La Paro, & Hamre, 2003) was used to rate each classroom's quality of emotional support in the Fall and Spring semesters of each grade (one hour of observations per classroom per semester, for a total of six timepoints). Using a 7-pont scale, two trained research assistants rated how characteristic each classroom was based on the mean of the five global constructs discussed above (i.e., positive climate, negative climate (reverse scored), teacher sensitivity, regard for student perspectives, and behavior management; α = 0.69 - 0.82; for more details see Pianta, La Paro, & Hamre, 2003). Approximately 20 percent of observations were double-coded at each timepoint with Cohen's kappas ranging from 0.88 to 1.00. In analyses examining concurrent effects of the classroom environment, grand mean centered raw scores from each timepoint were entered into the model. Raw scores of classroom emotional climate ranged from 2.2 to 6.8 and were centered at the grand mean in order to allow for intercept values to be within a possible range (i.e., it was impossible for classrooms to receive a score of 0) (grand mean = 5.29).

To determine whether long-term effects occurred across grades, Fall to Spring semester classroom emotional climate scores were averaged for each grade and used to classify children's experiences over time into multiple groups that reflected change or stability in classroom

emotional climates. Classrooms that received a score of six or greater were classified as emotionally supportive, whereas classrooms that received a score below six were classified as emotionally unsupportive. This procedure was used because very few classrooms scored in the low range, and past research has shown that most effects of classroom emotional climate occur between the moderate (scores of 3-5) and high (scores of 6-7) groups (e.g., Hamre & Pianta, 2005). Five mutually exclusive subgroups were formed: (1) The stable emotionally unsupportive group (- - -) was used as the control group and included children who experienced unsupportive classroom emotional climates across all grades (12%). (2) The stable emotionally supportive group (+ + +) included children who experienced supportive classroom emotional climates across all grades (43%). (3) The unsupportive-to-supportive group (- - -) included children who experienced emotionally unsupportive classroom climates in earlier grades but transitioned to and remained in supportive classrooms by fifth grade (19%). (4) The supportive-to-unsupportive group (+ + - or + - -) included children who experienced emotionally supportive classroom climates in earlier grades but transitioned to and remained in unsupportive classrooms by fifth grade (14%). (5) The varied support group (+ - + or - + -) included children who experienced emotionally supportive classroom in third and fifth grades but emotionally unsupportive classrooms in fourth grade or vice versa (12%).

Lunch status. At the outset of the study (i.e., Fall of third grade), parents indicated on permission forms whether children were eligible for free or reduced lunch status, which was used as a predictor of socioeconomic status.

CHAPTER III

RESULTS

Analytic Plan

Analyses of the effect of classroom emotional climate on levels of anxious solitude, exclusion, and as a moderator of the relation between anxious solitude and exclusion were conducted using cross-classified Poisson growth curve analysis in hierarchical linear modeling (HLM 6.0) (Raudenbush & Bryk, 2002; Raudenbush, Bryk, & Congdon, 2000). See Table 2 for means, medians, standard deviations, and correlations among all study variables.

Cross-classified longitudinal growth model. Because not all multilevel data is purely hierarchical, cross-classified models are useful to account for particular nesting structures (Hox, 2002; Raudenbush, 1993), such as various classrooms across time (i.e., semesters and grades). For example, a purely nested structure would occur if children were nested within the same classroom across third, fourth, and fifth grade. However in the current data, children are nested within multiple classrooms with various emotional climates over time, which provide an additional source of variation over time. In other words, longitudinal trajectories are not nested within single classrooms because each student experiences a unique series of classrooms across time as children are reshuffled to new classrooms with a new teacher and set of peers and varying emotional climates. For this reason, cross-classified longitudinal growth models are superior to typical two-level longitudinal growth models for the current analyses. Therefore, anxious solitude and exclusion can be influenced by both the effect of time and the time-varying effect of the classroom environment, and both are modeled as sources of variation.

Outcome variables (i.e., anxious solitude and exclusion) and time variables (Semester, Grade, and the interaction between Semester and Grade) were included in Level-1 of the model. In order to attenuate high correlations among the random effects of time variables when they were naively coded (Fall = 0, Spring = 1; third grade = 0, fourth grade = 1, fifth grade = 2), the grade time variable was coded to be orthogonal to (i.e., uncorrelated with) the semester time variable (third grade = -1, fourth grade = 0, fifth grade = 1). Predictors and covariates were also included in the cross-classified model. Predictors were child free lunch status (receiving free or reduced lunch = 1, not eligible for free or reduced lunch = 0), child sex (female = 0, male = 1), and the interaction between lunch status and child sex. Classroom emotional climate was included as a time-varying covariate.

Poisson regression. Poisson regression is an analytical method that is similar to linear regression but is typically used to model outcomes that are event counts (rather than continuous data) (Dobson & Barnett, 2008). Count variables never contain negative values (i.e., they are lower bound by zero), may have a high preponderance of zeros, and are typically positively skewed. Because both anxious solitude and exclusion are measured via counts (i.e., total number of nominations received) and because these counts are positively skewed toward zero (i.e., most children do not receive nominations for being anxious solitary or excluded), a Poisson distribution rather than a normal continuous distribution was employed.

Although the outcomes of Poisson regression are counts, Poisson regression actually models the rate of endorsements (i.e., λ, lambda). Because rates of an event occurring (i.e., of nominations or endorsements being made) are being modeled, it is important to account for variable exposure (i.e., variations over time in variables (e.g., classroom size) that modify rates of endorsements). In the current sample, classroom sizes varied from eight to 24 students

completing peer nominations. Moreover, class size cannot simply be added as an exposure variable without accounting for the fact that multiple peer nomination items were used to create composites for both outcome variables. Under the assumption of local independence of peer nominations (e.g., the assumption that each child nominates peers for each item separately and independently of all other nominations) (Lazarsfeld & Henry, 1968), class size must be adjusted based on the number of items included in each composite. For the current data, the exposure variable was $n \times r$, or the total number of participating students in each class (n) multiplied by the number of independent chances each child had to receive a nomination (r) (e.g., the total number of items used to create each composite). Therefore, the exposure variable equaled the total number of participating children in each class multiplied by three for anxious solitude and by two for exclusion. After accounting for exposure, predicted values under the Poisson distribution are estimated as the rate parameter (i.e., log of λ), which is a function of the exposure and predictors. In order for results to be interpretable, they must be discussed in terms of log values rather than actual number of nominations. Because λ yields an estimate that is multiplicative and non-linear, these results are difficult to compute, graph, and discuss. Because log rates are not lowerbound by zero (i.e., can range from negative to positive infinity) and are additive and linear, they can be discussed in similar terms as typical logistic regression with standard linear models. For this reason, all results will be discussed in terms of log(λ) values. Therefore, the y-axis on all figures should be interpreted as patterns of increments or decrements in partial predicted values rather than numbers of endorsements.

Moreover, Poisson processes have the characteristic that the mean is equal to the variance (Dobson & Barnett, 2008). However, it is common for empirically observed distributions to be over- or underdispersed when the empirically observed variance is either greater than or less than

the mean, respectively. When the observed variance is greater than the mean, overdispersion has occurred. Conversely, underdispersion occurs where there is less variation in the data than predicted. Over- and underdispersion are common with applied data analysis because these populations are typically more heterogeneous than the assumptions of many simple parametric models.

Because failing to adjust for over- and underdispersion would lead to over- or underestimating the variability in the data, current analyses were computed allowing for over- and underdispersion, which are manifested in an additional Level-1 error variance. When the Level-1 residuals are dispersed as predicted under the Poisson distribution, the Level-1 variance component equals 1.0 and drops out of the model. However when the Level-1 error variance is greater than or less than 1.0, the model is either over- or underdispersed, respectively. All of the models computed in the current analyses were somewhat underdispersed (with Level-1 error variance ranging from 0.80 - 0.90). It is likely that the underdispersion in this data is due to the overabundance of zeros in the outcome measures (i.e., there is less variability than expected by chance because most children do not receive nominations of anxious solitude or exclusion).

Unconditional Cross-classified Poisson Growth Models

Unconditional growth models were computed with both anxious solitude and exclusion as outcomes. Although models that included random effects for both child and classroom environment were attempted, the data did not support models with random effects for classrooms on any terms beyond the intercept (i.e., there were not adequate degrees of freedom to test these effects). Therefore, child random effects were included for the intercept term and for all time terms (Semester (Fall/Spring), Grade, Semester × Grade) in the model, as well as the random

effect on the intercept reflecting classroom heterogeneity. Identical estimated equations emerged for both outcomes:

Formula 1:

Level-1 Model

$$E(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$
$$V(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$

$$\lambda = e^{\pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade})}$$

OR

$$\log(\lambda) = \pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade})$$

Level-2 Model

$$\pi_0 = \Theta_{00} + b_{00} + c_{00}$$
$$\pi_1 = \Theta_{10} + b_{10}$$
$$\pi_2 = \Theta_{20} + b_{20}$$
$$\pi_3 = \Theta_{30} + b_{30}$$

where, $E(Y|\lambda)$ = predicted mean number of nominations given the rate parameter λ
$V(Y|\lambda)$ = predicted variance for number of nominations given the rate parameter
$n{\times}r$ = exposure (i.e., number of participating children per class × number of items in composite)
λ = the predicted rate of endorsement for individual children at a particular timepoint
σ^2 = additional error variance associated with underdispersion
π = individual level effects of time variables (i.e., Semester, linear Grade, Semester × Grade)
Θ = Level-2 intercept terms reflecting fixed effects of intercepts Semester, Grade, Semester × Grade
b = random effects associated with children, reflecting heterogeneity among children in endorsement rates
c = random effects associated with classrooms, reflecting heterogeneity in rates of endorsement associated with different classroom environments

See Table 3 for fixed and random effects for the unconditional models. Although the fixed effect associated with the Semester × Grade interaction was nonsignificant for exclusion, the random effect associated with this interaction indicated substantial heterogeneity among children and was thus retained in the model. Both unconditional models suggest that substantial heterogeneity among children and classrooms was left unexplained; therefore, conditional models that included additional predictors and covariates were computed.

Conditional Cross-classified Poisson Growth Models

The main goal of current analyses was to examine the influence of classroom emotional climate on anxious solitary children's risk for exclusion. However, before examining an interactive exclusion model with classroom emotional climate as a moderator of the relation between anxious solitude and peer exclusion, it is important to first describe anxious solitude and exclusion trajectories from third to fifth grade. Therefore, simplified models with anxious solitude and exclusion as outcomes were computed first. For the simplified models, all predictors associated with time (Semester (Fall/Spring), Grade, Semester × Grade), child demographic variables (Free Lunch Status, Sex, Free Lunch Status × Sex), and grand-mean centered classroom emotional climate (CEC) were included. The interactive exclusion model (presented below on page 23) included the same variables, as well as the predictor anxious solitude and interactions between anxious solitude and all time variables. Although simplified models that included random effects on the intercept and all time terms for both child and classroom environment were attempted, the data did not support inclusion of classroom random effects on the time terms. Therefore, child random effects were included for both the intercept and time terms, as well as a classroom random effect for the intercept term.

Conditional models that included the longitudinal effects of grade were tested for both simplified models and the interactive model. Effects of all classroom groupings (consistently unsupportive, consistently supportive, unsupportive-to-supportive, supportive-to-unsupportive, and varied support) were found to be nonsignificant in all three models (p = 0.18 - 0.99). Therefore, it was concluded that long-term effects of classroom emotional climate were not significant. Consequently, all subsequent analyses presented examined only concurrent effects of classroom emotional climate over time.

Model reduction was used to simplify these models and remove nonsignificant effects. Based on the principle of marginality (Nelder, 1977), which states that interactions cannot be tested in the absence of main effects, all variables included in higher-order interaction terms were also included in lower-order terms regardless of whether they were significant at the lower-order level. The principle of marginality also implies that main effects are uninterpretable in the presence of interactions because interactions reflect effects above and beyond additive main effects. Therefore, any significant main effects that were subsumed by a higher-order interaction will not be discussed. The models for anxious solitude and exclusion produced slightly different results. Each will be discussed in turn below.

Anxious solitude trajectories. Child demographic variables (i.e., free lunch status, child sex, and the interaction between the two) and the classroom variable (i.e., classroom emotional climate) were entered into the model as predictors. After removing nonsignificant effects through the process of model reduction, the following estimated equation for predicted anxious solitude emerged:

Formula 2:

Level-1 Model

$$E(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$
$$V(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$

$$\log(\lambda) = \pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade})$$

Level-2 Model

$$\pi_0 = \Theta_{00} + [b_{00} + + \beta_{01}* (\text{Free Lunch Status}) + \beta_{02}*(\text{Sex})] + [c_{00} + \gamma_{01}*(\text{CEC})]$$
$$\pi_1 = \Theta_{10} + b_{10} + [\gamma_{11}*(\text{CEC})]$$
$$\pi_2 = \Theta_{20} + b_{20}$$
$$\pi_3 = \Theta_{30} + b_{30}$$

where, $E(Y|\lambda)$ = predicted mean number of nominations given the rate parameter λ
$V(Y|\lambda)$ = predicted variance for number of nominations given the rate parameter
$n{\times}r$ = exposure (i.e., number of participating children per class × number of items in composite)
λ = the predicted rate of endorsement for individual children at a particular timepoint
σ^2 = additional error variance associated with underdispersion
π = individual level effects of time variables (i.e., Semester, linear Grade, Semester × Grade)
Θ = Level-2 intercept terms reflecting fixed effects of intercepts Semester, Grade, Semester × Grade
b = random effects associated with children, reflecting heterogeneity among children in endorsement rates
c = random effects associated with classrooms, reflecting heterogeneity in rates of endorsement associated with different classroom environments
β = fixed effects of child demographic variables (i.e., Free Lunch Status, Sex)
γ = fixed effects of classroom characteristics (i.e., classroom emotional climate)

All effects of time (i.e., Semester, Grade, and Semester × Grade) were significant and thus retained in the final model (see Table 4). There was a significant Semester × Grade interaction, suggesting that the rates of endorsement in Fall and Spring semesters were not consistent across grades, $\pi_3 = 0.07$, $p < .05$ (See Figure 1[3]). Specifically, Figure 1 shows the overall pattern that there was a decrease in the predicted values of anxious solitude between Fall

and Spring semesters across all grades, and this decrease was most pronounced between Fall and Spring semesters of third grade and less so in later grades.

The model of predicted anxious solitude endorsement rates included a significant Classroom Emotional Climate × Grade interaction, $\gamma_{21} = 0.14$, $p < .05$ (See Figure 2). In third grade, as hypothesized, as the quality of classroom emotional climate increased, predicted anxious solitude endorsement rates decreased. In fourth grade, there was no effect of classroom emotional climate on endorsement rates of anxious solitude. Contrary to expectations, the pattern reversed in fifth grade, with predicted anxious solitude endorsement rates increasing as quality of classroom emotional climate increased.

Child demographic variables also significantly affected endorsement rates. Students receiving free or reduced lunch versus other students were marginally significantly more likely to receive anxious solitude nominations, $\beta_{01} = 0.15$, $p < .10$. Furthermore, girls were significantly more likely to receive anxious solitude nominations than boys, $\beta_{02} = -0.37$, $p < .001$.

Peer exclusion trajectories. Child demographic variables and the classroom emotional climate were entered into the model as predictors. After removing nonsignificant effects through the process of model reduction, the following estimated equation for predicted exclusion emerged (see Formula 2 for definitions of terms):

Formula 3:

Level-1 Model

$$E(Y|\lambda) = n \times r * \lambda * \sigma^2$$
$$V(Y|\lambda) = n \times r * \lambda * \sigma^2$$

$$\log(\lambda) = \pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade})$$

Level-2 Model

$$\pi_0 = \Theta_{00} + [b_{00} + \beta_{01}*(\text{Free Lunch Status}) + \beta_{02}*(\text{Sex})] + [c_{00} + \gamma_{01}*(\text{CEC})]$$
$$\pi_1 = \Theta_{10} + [b_{10} + \beta_{11}*(\text{Free Lunch Status}) + \beta_{12}*(\text{Sex})] + [\gamma_{11}*(\text{CEC})]$$
$$\pi_2 = \Theta_{20} + [b_{20} + \beta_{21}*(\text{Free Lunch Status})] + [\gamma_{21}*(\text{CEC})]$$
$$\pi_3 = \Theta_{30} + [b_{30} + \beta_{31}*(\text{Free Lunch Status})]$$

All effects of time (i.e., Semester, Grade, and Semester × Grade) were significant and thus retained in the final model (see Table 5). Figure 3 is the composite figure of the exclusion trajectory across all timepoints, which shows a general decrease in exclusion nominations across grades, with a slight increase between Fall and Spring semesters of each grade. There was a significant Classroom Emotional Climate × Semester interaction, $\gamma_{11} = -0.08$, $p < .05$ (See Figure 4). For classrooms with low quality emotional climates, there were higher predicted values of exclusion overall; however, this difference was greater in Spring semesters than in Fall semesters. As predicted, the rate of endorsement of exclusion decreased for both semesters as quality of classroom emotional climate increased. For classrooms with high quality emotional climates, endorsement rates of exclusion were nearly identical in Fall and Spring semesters.

There was also a significant Lunch Status × Semester × Grade interaction, $\beta_{31} = 0.17$, $p < .05$ (See Figure 5). There was an overall decrease in endorsement rates of exclusion across all grades. Students receiving free or reduced lunch versus students not eligible for free or reduced lunch had consistently significantly higher predicted values of exclusion over time, and this trend was more pronounced in Spring semesters than in Fall semesters, particularly in later grades.

There was also a significant Child Sex × Grade interaction, $\beta_{12} = 0.14$, $p < .05$ (See Figure 6). Although boys and girls received similar endorsement rates for exclusion in third grade and a similar decrease across grades, there was a pattern for boys versus girls to receive relatively higher endorsement rates for exclusion over time.

Cross-classified Poisson Growth Model with Exclusion Outcome and Anxious Solitude × Classroom Emotional Climate Interaction

After computing models that included both anxious solitude and exclusion as outcomes, the next step was to include anxious solitude as a predictor of exclusion over time. Because past research has shown a positive relation between anxious solitude and exclusion, with anxious solitary children experiencing elevated peer exclusion shortly after school entry (e.g., Gazelle & Ladd, 2003), it is important to include anxious solitude as a predictor of exclusion in order to determine whether anxious solitary children versus other children are greater at risk for peer exclusion, especially in emotionally unsupportive classrooms. In order to standardize rates of anxious solitude endorsement across variations in class size, an adjusted anxious solitude variable was computed by dividing the total number of anxious solitude nominations received by the exposure variable. This adjusted anxious solitude variable was included as a predictor (range = 0.00-0.88) in the unconditional and conditional models.

Unconditional model. Like previous models, the data did not support the inclusion of all possible random effects in the model. As in previous models, random effects on child variables were included in the model for the intercept term and for all time terms (Semester, Grade, Semester × Grade), as well as the random effect on the intercept reflecting classroom heterogeneity. After removing nonsignificant effects through the process of model reduction, the following formula for the cross-classified unconditional Poisson exclusion growth model with anxious solitude as a predictor emerged (see Formula 1 for definitions of terms):

Formula 4:

Level-1 Model

$$E(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$
$$V(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$

$$\log(\lambda) = \pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade}) + \pi_4*(\text{Anxious Solitude}) + \pi_5*(\text{Anxious Solitude} \times \text{Semester}) + \pi_6*(\text{Anxious Solitude} \times \text{Grade}) + \pi_7*(\text{Anxious Solitude} \times \text{Semester} \times \text{Grade})$$

Level-2 Model

$$\pi_0 = \Theta_{00} + b_{00} + c_{00}$$
$$\pi_1 = \Theta_{10} + b_{10}$$
$$\pi_2 = \Theta_{20} + b_{20}$$
$$\pi_3 = \Theta_{30} + b_{30}$$
$$\pi_4 = \Theta_{40}$$
$$\pi_5 = \Theta_{50}$$
$$\pi_6 = \Theta_{60}$$
$$\pi_7 = \Theta_{70}$$

See Table 6 for fixed and random effects for the unconditional model. Although the fixed effect associated with the Semester × Grade interaction was not significant, the associated random effect suggested substantial heterogeneity among children and was thus retained in the model. In addition, the Anxious Solitude × Semester × Grade interaction fixed effect was also not significant but was retained in the model because heterogeneity among children was likely (although the data did not support a random effect associated with this term due to limited degrees of freedom). The unconditional model suggested that substantial heterogeneity among children and classrooms was left unexplained; therefore, a conditional model that included additional predictors and covariates was computed.

Conditional model. Child demographic variables and classroom emotional climate were entered into the model as predictors. An additional exploratory model was computed that

included externalizing behaviors (peer-reported attention-seeking and aggressive behaviors) as control variables, but the inclusion of these variables did not affect the pattern of results and are thus not presented. After removing nonsignificant effects through the process of model reduction, the following estimated equation for the cross-classified conditional Poisson exclusion growth model including the anxious solitude × classroom emotional climate interaction emerged (see Formula 2 for definitions of terms):

Formula 5:

Level-1 Model

$$E(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$
$$V(Y|\lambda) = n{\times}r * \lambda * \sigma^2$$

$$\log(\lambda) = \pi_0 + \pi_1*(\text{Semester}) + \pi_2*(\text{Grade}) + \pi_3*(\text{Semester} \times \text{Grade}) + \pi_4*(\text{Anxious Solitude}) + \pi_5*(\text{Anxious Solitude} \times \text{Semester}) + \pi_6*(\text{Anxious Solitude} \times \text{Grade}) + \pi_7*(\text{Anxious Solitude} \times \text{Semester} \times \text{Grade})$$

Level-2 Model

$$\pi_0 = \Theta_{00} + [b_{00} + \beta_{01}*(\text{Free Lunch Status}) + \beta_{02}*(\text{Sex})] + [c_{00} + \gamma_{01}*(\text{CEC})]$$
$$\pi_1 = \Theta_{10} + [b_{10} + \beta_{11}*(\text{Free Lunch Status}) + \beta_{12}*(\text{Sex})]$$
$$\pi_2 = \Theta_{20} + [b_{20} + \beta_{21}*(\text{Free Lunch Status}) + \beta_{22}*(\text{Sex})] + [\gamma_{21}*(\text{CEC})]$$
$$\pi_3 = \Theta_{30} + [b_{30} + \beta_{31}*(\text{Free Lunch Status})]$$
$$\pi_4 = \Theta_{40} + [\beta_{41}*(\text{Free Lunch Status}) + \beta_{42}*(\text{Sex})] + [\gamma_{41}*(\text{CEC})]$$
$$\pi_5 = \Theta_{50} + [\beta_{51}*(\text{Free Lunch Status})]$$
$$\pi_6 = \Theta_{60} + [\beta_{61}*(\text{Free Lunch Status})] + [\gamma_{61}*(\text{CEC})]$$
$$\pi_7 = \Theta_{70} + [\beta_{71}*(\text{Free Lunch Status})]$$

All random effects of time (i.e., Semester, Grade, and Semester × Grade) were significant and thus retained in the final model (see Table 7). The model of predicted exclusion endorsement rates included a significant Anxious Solitude × Classroom Emotional Climate × Semester interaction, $\gamma_{51} = 0.69$, $p < .01$ (See Figure 7: Panel A, low quality classroom emotional climate

(CEC= 2); Panel B, moderate quality classroom emotional climate (CEC = 5); and Panel C, high quality classroom emotional climate (CEC = 7). In Fall semesters, regardless of classroom emotional climate, as levels of anxious solitude increased, predicted values of exclusion also increased. Specifically, consistent with hypotheses, children with no anxious solitude nominations in Fall semesters received the lowest endorsement rates of exclusion, whereas children with higher overall levels of anxious solitude received higher endorsement rates of exclusion.

However, in Spring semesters, results were dependent on quality of classroom emotional climate. Specifically, in low quality classrooms (see Panel A), an unexpected negative relation appeared such that children with higher levels of anxious solitude received lower endorsement rates of exclusion. Differences between Fall and Spring semesters were less pronounced in moderate quality classrooms (see Panel B). Furthermore, consistent with expectations, in high quality classrooms (See Panel C), differences in exclusion endorsement rates between children with different levels of anxious solitude disappeared by Spring semesters. However, inconsistent with expectations, there were lower endorsement rates of exclusion for anxious solitary children in low versus high quality classrooms.

The model of predicted exclusion endorsement rates also included a significant Anxious Solitude × Lunch Status × Semester × Grade interaction, $\beta_{71} = -1.28$, $p < .05$ (See Figure 8: Panel A for Free or Reduced Lunch, Panel B for Full-Priced Lunch). Specifically, consistent with hypotheses, the predicted values of exclusion were similar across grades and free lunch status for Fall semesters, with an increase in endorsement rates of exclusion as levels of anxious solitude increased. Children receiving free or reduced lunch versus others had higher initial endorsements rates of exclusion; however, this difference diminished at the highest levels of anxious solitude.

However, contrary to hypotheses, results differed in Spring semesters. There was an overall decrease in predicted values of exclusion as anxious solitude levels increased. The pattern of results also differed across grades for students receiving free or reduced lunch versus those who were not. Consistent with the overall decrease in endorsement rates of exclusion across grades, children receiving free or reduced lunch (see Panel A) received highest endorsement rates of exclusion in third grade and lowest levels in fifth grade. However, this decrease was less pronounced in third grade, particularly for children with the highest levels of anxious solitude. For students who were not eligible for free or reduced lunch (see Panel B), there was also a general decrease in endorsement rates of exclusion across grades and across levels of anxious solitude. By the Spring semester of fifth grade, differences among anxious solitude levels were no longer present, with students receiving equal exclusion endorsement rates regardless of anxious solitude level.

The model of predicted exclusion endorsement rates included a significant Child Sex × Semester interaction, $\beta_{12} = -0.12$, $p < .05$ (See Figure 9). Specifically, after accounting for anxious solitude in the model, there were no sex differences in endorsement rates of exclusion in Spring semesters, but in Fall semesters, boys versus girls received significantly higher endorsement rates for exclusion. Both boys and girls received similarly high endorsement rates of exclusion in Spring semesters compared with Fall semesters.

CHAPTER IV

DISCUSSION

The current study examined the influence of the elementary classroom environment on children's experiences of anxious solitude, peer exclusion, and anxious solitary children's risk for peer exclusion across Fall and Spring semesters of third, fourth, and fifth grades. Results support the child × environment model and suggest that high quality classroom emotional climates are protective for anxious solitary children. However, findings for the effects of low quality classrooms on anxious solitary children did not always conform to expectations. Results also conclude that longitudinal effects of classroom emotional climate did not occur as only concurrent effects were present. Implications of findings for anxious solitude trajectories, peer exclusion trajectories, as well as trajectories with classroom emotional climate as a moderator of the relation between anxious solitude and peer exclusion will be discussed in turn below.

Anxious Solitude Trajectories

Current analyses found a general decrease in anxious solitude across all timepoints. Specifically, there was a decrease between the Fall and Spring semesters across all grades, and this decrease was most pronounced between the Fall and Spring semesters of third grade and less so in later grades (See Figure 1). This overall decrease is contrary to evidence from Gazelle and Ladd (2003) that mean levels of anxious solitude remained stable from kindergarten to fourth grade. This is likely a function of measurement techniques and children's ages. Specifically, Gazelle and Ladd focused on children's annual adjustment from kindergarten through fourth grade. The current study examined effects semiannually from third through fifth grade. It is

unknown whether variations within grade would have been found in the Gazelle and Ladd examination. Additionally, although there is a two-year overlap between these studies, the stability in anxious solitude found in Gazelle and Ladd's examination may be due to the three previous years (i.e., kindergarten through second grade) that were not examined in the current study. Furthermore, anxious solitude trajectories were qualified by an interaction between classroom emotional climate and grade. Specifically, results indicated that children's levels of anxious solitude were influenced by classroom emotional climate, but this influence was dependent upon grade (See Figure 2). The hypothesized effect of classroom emotional climate on anxious solitude was found in third grade, there was no effect in fourth grade, and the opposite effect of predictions was found in fifth grade. Specifically, consistent with hypotheses, in third grade children received lower anxious solitude endorsement rates when in higher versus lower quality classrooms. Therefore, in third grade, evidence suggests that classrooms characterized by supportive emotional climates decreased children's anxious solitary behavior in the eyes of their peers. Conversely, classrooms characterized by unsupportive emotional climates increased children's anxious solitary behavior in the eyes of their peers.

The pattern in fifth grade was opposite of predictions, such that higher quality classroom emotional climate predicted an increase in anxious solitude. It may be that classrooms with positive emotional climates produce negative effects on anxious solitude in fifth grade because children have more firmly established peer relationships and reputations in later grades and are less influenced by external efforts by teachers to incorporate them in positive peer experiences. Furthermore, at older ages, efforts by the teacher to incorporate children with anxious tendencies into positive classroom experiences may actually be counterproductive and increase levels of anxious solitude. Specifically, as children become more self-aware of their own anxious solitude

as they age (Andersen & Chen, 2002), teacher-driven interactions with peers may actually increase social evaluative concerns when they are required to interact with peers.

Results also indicated that, across all timepoints, girls versus boys received more anxious solitude nominations. Although past research typically finds equal prevalence of anxious solitude among boys and girls in early childhood (Coplan et al., 2001), clinically significant social anxiety is more common among girls than boys in later middle childhood and early adolescence (Albano & Krain, 2005). Therefore, these results are likely due to differences in prevalence as children age.

Although there were no specific predictions regarding child demographic variables, children receiving free or reduced lunch versus other children received significantly higher anxious solitude endorsement rates across all timepoints. Past research has found that parenting beliefs of parents with low socioeconomic status may be related to child anxious solitary behavior (Mills & Rubin, 1992). Additionally, another possible explanation may be related to stress related to low socioeconomic status. Children who were economically disadvantaged may experience higher levels of anxious solitude because they may expensive substantial stress due to limited economic resources.

Peer Exclusion Trajectories

In the simplified exclusion model, there was a general decrease in exclusion endorsement rates across grades but with a slight increase from Fall to Spring semesters of each grade (See Figure 3). Like the pattern for anxious solitude, these overall decreases are contrary to evidence from Gazelle and Ladd (2003) that mean levels of peer exclusion increased from kindergarten to fourth grade. As mentioned above, this is likely a function of children becoming more selective of their social partners as they age (Rubin, Bukowski, & Parker, 2006). Because they become

more selective about social groups, it is possible that their knowledge of others' behaviors over time may become relatively more limited because they focus on members of their own social groups rather than peers with whom they do not interact. Furthermore, the slight increase from Fall to Spring semesters, which suggests that children are more exclusive in Spring semesters, may also be related to children's peer group affiliations. By Spring semesters, children are likely to have solidified social groups, leaving some peers excluded from these groups.

Exclusion trajectories were further qualified by an interaction between classroom emotional climate and Fall to Spring semesters. For classrooms with low quality emotional climates, there were higher predicted values of exclusion overall, and this difference was greater in Spring semesters than in Fall semesters (See Figure 4). Thus, for both semesters, the rate of endorsements of exclusion decreased as quality of classroom emotional climate increased. These findings support hypotheses that children were more likely to experience exclusion when in classrooms with low quality emotional climates. Moreover, it appears that spending more time in these unsupportive classrooms (from Fall to Spring within a grade) increased levels of exclusion, suggesting that these classrooms become increasingly detrimental to children over time. Because endorsement rates of exclusion were nearly identical for the Fall and Spring semesters as quality of classroom climate increased, findings also suggest that high quality classrooms have the ability to protect their vulnerable members over time. It may be that teachers in high quality classrooms are able to prevent or eliminate peer exclusion rapidly in Fall semesters, and to ensure that peer exclusion does not occur throughout the school year. Peers may be less likely to engage in exclusion, perhaps because the teacher discourages this behavior or students are more positively connected with one another. Furthermore, if peer exclusion does occur in these positive classrooms, the teacher may quickly eliminate this behavior.

Exclusion trajectories over time were qualified by the effect of lunch status across all timepoints. Specifically, students receiving free or reduced lunch versus others had consistently significantly higher predicted values of exclusion over time in the simplified exclusion model, and this trend was more pronounced in Spring semesters than in Fall semesters, particularly in later grades (See Figure 5). Although these results were not predicted, they follow a sensible pattern. Economically disadvantaged children may be at-risk for higher levels of exclusion because peers may identify these children as "different" based on their appearance or dress and treat them more negatively in response. Furthermore, lower socioeconomic status is typically correlated with behavior problems (and was significantly correlated with externalizing and attention-seeking behavior in the current data), so this effect may be related to other socially undesirable behaviors that children display. It is also possible that economically disadvantaged children's parents may be less involved in the school environment and may not intervene when their children experience peer adversity at school. In addition, elevated exclusion endorsement rates in Spring semesters may be a function of students being more aware of differences among peers as they spend more time with one another.

Finally, exclusion trajectories were also qualified by an interaction between child sex and grade. Although boys and girls received similar endorsement rates of exclusion in third grade and both received decreasing endorsement rates of exclusion over time, this decrease was steeper for girls than boys, suggesting that boys versus girls had higher endorsement rates of exclusion in fourth and fifth grades (See Figure 6). This result is likely due to evidence suggesting that boys versus girls experience higher levels of peer mistreatment as they age (Craig et al., 2000).

Peer Exclusion Trajectories with Anxious Solitude × Classroom Emotional Climate Interaction

The trajectories of exclusion from the interactive model revealed an interaction between anxious solitude, classroom emotional climate, and Fall to Spring semesters. Results were as predicted in Fall semesters such that children with low levels of anxious solitude nominations in Fall semesters received the lowest endorsement rates of exclusion, whereas children with higher levels of anxious solitude received higher endorsement rates of exclusion. However, effects in the Spring were dependent on both quality of classroom emotional climate and anxious solitude.

In low quality classrooms in Spring semester (See Figure 7, Panel A), exclusion endorsement rates were opposite of predictions such that children with the highest levels of anxious solitude nominations had the lowest endorsement rates of exclusion. These unexpected results may be explained by limitations of the classroom emotional climate coding system. Specifically, there are different ways in which classrooms may score low on ratings of classroom emotional climate. Classroom that are (1) unstructured and chaotic or (2) overly structured and overcontrolling both receive similarly low classroom emotional climate scores with the current coding system. When unsupportive classrooms are unorganized and chaotic and children are allowed to socialize freely, children with social evaluative concerns may be less likely to initiate social conversation and thus be left out of these social interactions, leaving them alone while others socialize. In these environments, children are unlikely to involve anxious solitary children in interactions and thus nominate them as excluded. Conversely, in emotionally unsupportive classrooms that are highly controlled by teachers, children with anxious tendencies may actually experience less anxiety because there is little pressure for children to interact with one another, so they are able to remain quiet and solitary when teachers make no efforts to provide positive peer

experiences. Therefore, peers may be less likely to notice anxious solitary behavior or to nominate these peers as excluded. Because the CLASS coding framework (Pianta, La Paro, & Hamre, 2003) classifies classrooms as unsupportive without distinguishing between negative classrooms that are chaotic versus overcontrolling, it is impossible to determine whether these different aspects of unsupportive classrooms affect children differently.

Moreover, it may be useful in future conceptualizations of the CLASS framework to liken the classroom emotional climate to Baumrind's parenting styles framework (1967). Specifically, supportive classroom emotional climates may be similar to Baumrind's authoritative parenting style, in which parents and teachers are able to balance discipline with warmth. Unsupportive classroom emotional climates may be similar to either neglectful or authoritarian parenting styles. Specifically, some teachers, like neglectful parents, are unstructured and allow for a great deal of chaos and disorganization in their classrooms; whereas others, like authoritarian parents, are overly structured and controlling of children's movements and interactions. Future examinations should attempt to differentially code observations of unsupportive climates to determine if differences between these aspects of negative climates contribute to differential child outcomes.

In moderate quality classrooms (See Figure 7, Panel B), differences between Fall and Spring semesters in endorsement rates of exclusion among children were much less pronounced, and these differences disappeared in classrooms with high quality emotional climates (See Figure 7, Panel C). Although children with higher levels of anxious solitude received higher endorsement rates of exclusion in Fall semesters, high quality classrooms appear to equate differences in vulnerability among children and lead to lower endorsement rates of exclusion by Spring semesters. Therefore, it appears that sensitive teacher support has hypothesized effects

and is able to decrease levels of exclusion in high quality classrooms. These results are also consistent with Gazelle (2006) that high quality classrooms are protective for anxious solitary children. However, contrary to Gazelle (2006), low quality classrooms do not appear to be detrimental, and actually appear to lead to lower levels of peer exclusion, to anxious solitary children in later middle childhood. Although effects of low quality classrooms require further examination, high quality classrooms appear to be protective for anxious solitary children.

Exclusion trajectories from the interactive model were further qualified by an interaction between anxious solitude and lunch status across all timepoints (See Figure 8). In Fall semesters, there was a positive relation among anxious solitude and peer exclusion such that endorsement rates of exclusion increased as levels of anxious solitude increased. Similar to findings from the simplified exclusion model, there was a decrease in exclusion rates across grades. The pattern of results for children with free or reduced lunch versus other children was similar across levels of anxious solitude as well; however, children who received free or reduced lunch had higher initial starting values for exclusion. The differences among these groups diminished as levels of anxious solitude increased, with children with the highest levels of anxious solitude receiving relatively high rates of exclusion endorsements regardless of lunch status. Therefore, it seems that at the highest levels of anxious solitude, the effects of grade and free lunch status are overshadowed by the effect of high anxious solitude levels.

Results in Spring semesters were as expected for effects of grade and free or reduced lunch status, with children receiving higher rates of exclusion when in earlier grades and when receiving free or reduced lunch. However, there was an unexpected negative relationship between anxious solitude and exclusion such that predicted rates of exclusion decreased as anxious solitude increased. Fall to Spring effects differed by grade. In Spring semesters, children

receiving free or reduced lunch had the highest levels of exclusion in third grade and the lowest levels of exclusion in fifth grade. However, for other children, differences between grades diminished at the highest levels of anxious solitude. Although results are less clear for Spring semesters, results from Fall semesters were as predicted and add to previous research that anxious solitude often leads to peer exclusion.

Finally, exclusion trajectories in the interactive model were further qualified by an interaction between child sex and Fall to Spring semesters. Both boys and girls had increasing levels of exclusion from Fall to Spring semesters, and boys versus girls had higher rates of exclusion in Fall semesters (See Figure 9). These results may be related to children's knowledge of one another over time. Because girls and boys received similar endorsement rates in Spring semesters, it may be that as children develop knowledge of one another through experience over time, gender becomes a less important factor when nominating peers as excluded.

Contributions and Limitations

Results support the child × environment model of children's peer adjustment. The current investigation provides evidence that the influence of classroom emotional climate has differential effects on children in later middle childhood (versus early middle childhood) and that these effects are concurrent but not long-term. When predicting anxious solitude, it appears that positive classroom environments have expected effects, such that high quality classrooms are protective and low quality classrooms are detrimental, on children in third but not in later elementary school grades. When predicting exclusion, it appears that positive classroom environments have expected strong impacts on children across both Fall and Spring semesters and that these effects are consistent across grades. In the interactive model with classroom emotional climate as a moderator of anxious solitary children's risk for peer exclusion, although

results regarding low quality classrooms did not support hypotheses, it appears that high quality classrooms are protective for anxious solitary children by Spring semesters across all grades.

Although long-term effects of classroom climates were predicted, it is not surprising that only concurrent effects were observed in the current study. Specifically, children appear to be influenced by the environments they concurrently experiences, but not by past environments in which they are no longer present. Therefore, it appears that anxious solitary children are able to start anew in a new classroom each year without the influence of previous classroom environments carrying over to new environments. Although classrooms do not appear to have longitudinal influences in later middle childhood in the current study, this is the first examination of longitudinal influences of classroom emotional climate. Therefore, future examinations should examine whether long-term effects occur at other age groups, such as in early middle childhood as children are beginning school.

Although some past longitudinal research has examined peer nominations using hierarchical linear modeling, the current study is the first to use the cross-classified longitudinal model and a Poisson distribution. The cross-classified model is particularly ideal for these analyses because children's classroom experiences provide additional variation rather than simply being a level of organization. By ignoring the influence of the classroom context, researchers are failing to take into account a possible covariate that moderates children's peer adjustment. Furthermore, the cross-classified model allows for the examination of the classroom context, which is the environmental variable of interest in the current analyses. Although traditional two-level hierarchical models do allow for the inclusion of classroom emotional climate as a time-varying covariate, they do not allow for variation to exist among teachers and children. The cross-classified model allows for the nesting of children within time and within classrooms, while

also allowing for variability to exist among children and classrooms. Poisson regression is also a particularly sophisticated method for examining sociometric data because peer nominations are based on counts (i.e., total number of nominations received), are often positively skewed toward zero, and include variable exposure.

The current investigation is not without limitations. Current analyses used a variable-oriented approach rather than a person-oriented approach. It has been established that different subtypes of anxious solitary children follow heterogeneous trajectories (Gazelle, 2008), with some experiencing increasing levels of peer exclusion over time and others escaping peer difficulties (Gazelle & Ladd, 2003; Gazelle & Rudolph, 2004; Oh et al., 2008). By examining effects on average, information regarding the heterogeneity that exists among anxious solitary children is incomplete. Specifically, this may explain why the interactive model with classroom emotional climate as a moderator of the relation between anxious solitude and exclusion produced some contradictory effects. Futures studies should examine subgroups of anxious solitary children to determine if the classroom environment differentially affects different subgroups of anxious solitary children.

Another explanation for contradictory results regarding the influence of classroom emotional climate in the interactive exclusion model may be due to the possible differential effects of chaotic and overcontrolled unsupportive classrooms on anxious solitary children. Because these two unsupportive atmospheres may influence anxious solitary children differentially, future conceptualizations of the CLASS framework should consider examining these two unsupportive climates separately.

It is important to note that there were no interactions between classroom emotional climate and child sex. Therefore, the quality of the classroom environment appears to impact

children equally regardless of gender. This finding is contrary to Gazelle (2006), which found that classroom emotional climate differentially impacted trajectories for boys and girls. These differing results are likely due to methodology. Specifically, Gazelle (2006) focused on teacher-reported rejection and victimization as outcomes rather than peer-reported peer exclusion. Although teachers provide valid perceptions of child behaviors, recent research suggests that peers are the most valid source of information on solitary child behaviors in middle childhood (Spangler & Gazelle, 2009).

It is important to note that, in each model, substantial heterogeneity existed for children and classrooms, even after accounting for additional predictors and covariates. Although the current analyses were able to explain additional variance, the constructs examined were not all-inclusive of the factors that influence children's social development. It was not expected that the current study would explain all the variance associated with these constructs because it is well accepted that children's social development is complex. Therefore, the purpose of the current study was to examine the influence of one environmental factor on children's anxious solitude and exclusion, so additional variance was expected even after accounting for the additional predictors and covariates in the current analyses.

Current results provide evidence that elementary school classroom emotional climate has concurrent but not long-term effects on anxious solitary children's peer adjustment in later middle childhood. Current results suggest that supportive classroom emotional climates have protective effects on anxious solitary children by Spring semesters across all grades. Results suggest that when teachers provide supportive classroom experiences, they are able to decrease levels of peer exclusion in their classrooms. These results would be useful for educating teachers about the impact of the classroom on anxious solitary children's risk for negative peer adjustment.

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Appendix A. Tables and Figures

Table 1.

Number of Original Participants Completing Measures across Grades and Semesters

	Third Grade	Fourth Grade	Fifth Grade
Number of Participants with Data			
Fall only	27	12	11
Spring only	0	0	0
Both Fall and Spring	661	510	406
Total	688	522	417

Note. 82% of children had complete data across two grades (either both third and fourth or both third and fifth). 56% of children had complete data across all three grades.

Table 2.

Means, Medians, Standard Deviations, and Correlations among Study Variables

	Anxious Solitude						Peer Exclusion					
	3rd Fall	3rd Spring	4th Fall	4th Spring	5th Fall	5th Spring	3rd Fall	3rd Spring	4th Fall	4th Spring	5th Fall	5th Spring
Mean	3.37	2.64	2.51	2.76	2.97	2.74	2.51	2.29	1.80	1.91	2.10	1.90
Median	2.00	1.00	1.00	1.00	1.00	0.00	2.00	1.00	1.00	1.00	1.00	0.00
SD	3.95	4.35	4.26	5.40	5.86	6.34	2.93	3.46	3.14	3.61	4.04	4.12
Outcomes												
Anxious Solitude (AS)												
Third Grade												
Fall	1.00											
Spring	0.72 ***	1.00										
Fourth Grade												
Fall	0.55 ***	0.62 ***	1.00									
Spring	0.51 ***	0.56 ***	0.79 ***	1.00								
Fifith Grade												
Fall	0.51 ***	0.50 ***	0.75 ***	0.70 ***	1.00							
Spring	0.51 ***	0.52 ***	0.73 ***	0.72 ***	0.90 ***	1.00						
Peer Exclusion												
Third Grade												
Fall	0.47 ***	0.41 ***	0.36 ***	0.39 ***	0.36 ***	0.33 ***	1.00					
Spring	0.38 ***	0.55 ***	0.40 ***	0.43 ***	0.33 ***	0.32 ***	0.66 ***	1.00				
Fourth Grade												
Fall	0.36 ***	0.43 ***	0.44 ***	0.44 ***	0.43 ***	0.37 ***	0.62 ***	0.62 ***	1.00			
Spring	0.34 ***	0.40 ***	0.55 ***	0.55 ***	0.40 ***	0.42 ***	0.63 ***	0.63 ***	0.80 ***	1.00		
Fifith Grade												
Fall	0.34 ***	0.37 ***	0.45 ***	0.48 ***	0.59 ***	0.50 ***	0.62 ***	0.59 ***	0.63 ***	0.64 ***	1.00	
Spring	0.33 ***	0.32 ***	0.37 ***	0.42 ***	0.50 ***	0.55 ***	0.63 ***	0.58 ***	0.60 ***	0.62 ***	0.90 ***	1.00
Time-varying Covariate												
Classroom Emotional Climate (CEC)												
Third Grade												
Fall	0.08	0.07					0.06	-0.14				
Spring	0.02	0.05					-0.04	-0.08				
Fourth Grade												
Fall			0.04	0.38					-0.07	-0.08		
Spring			-0.09	-0.11					-0.10	0.12		
Fifith Grade												
Fall					-0.14	-0.12					0.13	0.23
Spring					0.23	0.25					0.10	0.12
Time-varying Exposure Variable												
Number of Participating Students in Class												
Third Grade												
Fall	-0.03	0.03					-0.09	0.10 *				
Spring	-0.04	0.04					-0.08	0.09 *				
Fourth Grade												
Fall			-0.02	0.06					0.01	0.06		
Spring			-0.03	0.05					0.01	0.05		
Fifith Grade												
Fall					-0.01	-0.03					0.04	0.01
Spring					-0.01	-0.01					0.04	0.01
Time												
Fall to Spring (FS; fall = 0, spring = 1)	-0.06	-0.08 *	-0.03	-0.03	0.01	0.01	-0.03	-0.03	-0.05	-0.02	-0.01	-0.02
Grade (third = -1, fourth = 0, fifth = 1)	-0.01	-0.03	-0.02	0.03	0.04	0.03	0.02	-0.03	-0.06	-0.02	0.02	0.03
Child Demographic Variables												
Free Lunch Status (Lunch; yes = 1, no = 0)	0.01	-0.01	0.03	0.00	0.01	-0.03	0.10 *	0.00	0.04	0.02	-0.02	-0.03
Sex (female = 0, male = 1)	-0.15 **	-0.06	-0.05	-0.01	0.00	0.12 *	0.05	0.04	0.09 *	0.07	0.15 **	0.12 *

Note. N = 688. †p < .10, *p < .05, **p < .01, ***p < .001.
Correlations among time-varying variables (i.e., Classroom Emotional Climate and N per Class) are only shown concurrently because no correlations existed with non-concurrent variables.

Table 2.

Means, Medians, Standard Deviations, and Correlations ar elations among Study Variables

		Classroom Emotional Climate						Number of Participating Students Per Class									
		3rd Fall	3rd Spring	4th Fall	4th Spring	5th Fall	5th Spring	3rd Fall	3rd Spring	4th Fall	4th Spring	5th Fall	5th Spring	FS	Grade	Lunch	Sex
	Mean	5.19	5.07	5.39	5.55	5.26	5.05	15.10	14.91	18.23	18.18	18.82	18.57	0.48	-0.17	0.29	0.49
	Median	5.15	4.90	5.60	5.60	5.50	5.25	15.00	15.00	19.00	19.00	18.00	18.00	0.00	0.00	0.00	0.00
	SD	0.75	0.89	0.69	0.73	0.72	0.79	2.92	2.95	2.74	2.87	2.89	2.94	0.50	0.82	0.46	0.50
Outcomes																	
Anxious Solitude (AS)																	
Third Grade																	
Fall																	
Spring																	
Fourth Grade																	
Fall																	
Spring																	
Fifith Grade																	
Fall																	
Spring																	
Peer Exclusion																	
Third Grade																	
Fall																	
Spring																	
Fourth Grade																	
Fall																	
Spring																	
Fifith Grade																	
Fall																	
Spring																	
Time-varying Covariate																	
Classroom Emotional Climate (CEC)																	
Third Grade																	
Fall		1.00															
Spring		0.64 ***	1.00														
Fourth Grade																	
Fall				1.00													
Spring				0.38 **	1.00												
Fifith Grade																	
Fall						1.00											
Spring						0.47 ***	1.00										
Time-varying Exposure Variable																	
Number of Participating Students in Class																	
Third Grade																	
Fall		-0.22 *	0.08					1.00									
Spring		-0.21 *	-0.02					0.99 ***	1.00								
Fourth Grade																	
Fall				0.06	0.06					1.00							
Spring				-0.18	0.22					0.99 ***	1.00						
Fifith Grade												1.00					
Fall						-0.34	0.26					0.99 ***	1.00				
Spring						-0.34	0.23										
Time																	
Fall to Spring (FS; fall = 0, spring = 1)		0.00	-0.01	0.01	0.006	-0.03	-0.03	-0.02	-0.02	-0.02	-0.04	0.05	0.05	1.00			
Grade (third = -1, fourth = 0, fifth = 1)		0.10	0.04	-0.12	-0.11	-0.17	0.01	0.00	0.05	0.05	0.03	-0.03	-0.02	0.00	1.00		
Child Demographic Variables																	
Free Lunch Status (Lunch; yes = 1, no = 0)		-0.02	-0.01	-0.06	-0.065	-0.03	-0.11	-0.29 ***	-0.36 ***	-0.36 ***	-0.34 ***	-0.28 ***	-0.30 ***	-0.02	0.00	1.00	
Sex (female = 0, male = 1)		0.22 †	0.15	-0.11	-0.019	-0.01	-0.18	0.04	0.05	0.05	0.06	-0.05	-0.04	-0.02	0.01	0.02	1.00

Note. N = 688. †p < .10, *p < .05, **p < .01, ***p < .0
Correlations among time-varying variables (i.e., Classroom

Table 3.

Unconditional Cross-classified Poisson Growth Models for Simplified Models

	Outcomes							
	Anxious Solitude				Peer Exclusion			
Fixed effect	Coefficient	*SE*	*t*	*p*	Coefficient	*SE*	*t*	*p*
Initial status, π_0								
Mean initial status, Θ_{00}	-3.70	0.07	-56.20	0.000 ***	-3.41	0.06	-58.37	0.000 ***
Semester change, π_1								
Mean change rate, Θ_{10}	-0.16	0.01	-11.26	0.000 ***	-0.12	0.02	-8.10	0.000 ***
Grade change, π_2								
Mean change rate, Θ_{20}	-0.06	0.06	-9.70	0.000 ***	-0.50	0.05	-9.76	0.000 ***
Semester × Grade change, π_3								
Mean change rate, Θ_{30}	0.04	0.02	2.15	0.031 *	-0.01	0.02	-0.48	0.628
Random effects	Variance		χ^2		Variance		χ^2	
Child								
Initial status, b_{00}	1.38		9980.86	0.000 ***	1.11		8149.44	0.000 ***
Semester change rate, b_{10}	0.02		695.62	0.000 ***	0.05		456.77	0.001 ***
Grade change rate, b_{20}	0.37		2746.33	0.000 ***	0.20		504.13	0.000 ***
Semester × Grade change rate, b_{30}	0.03		548.03	0.011 *	0.04		561.62	0.004 **
Classroom								
Initial status, c_{00}	0.19		604.55	0.000 ***	0.14		603.42	0.000 ***
Level-1 error, e	0.90				0.83			

Note. $N = 688$. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 4.

Conditional Cross-classified Poisson Simplified Anxious Solitude Growth Model

	Anxious Solitude			
Fixed Effects	Coefficient	*SE*	*t*	*p*
Initial status, π_0				
Mean initial status, Θ_{00}	-3.38	0.34	-9.96	0.000 ***
Child Demographic Variables				
Free Lunch Status, β_{01}	0.15	0.09	1.66	0.096 †
Sex, β_{02}	-0.37	0.08	-4.79	0.000 ***
Time-varying Covariate				
Classroom Emotional Climate, γ_{01}	-0.01	0.06	-0.10	0.921
Semester change, π_1				
Mean initial status, Θ_{10}	-0.33	0.03	-11.32	0.000 ***
Grade change, π_2				
Mean initial status, Θ_{20}	-1.37	0.39	-3.56	0.001 ***
Time-varying Covariate				
Classroom Emotional Climate, γ_{21}	0.14	0.07	2.00	0.046 *
Semester × Grade change, π_3				
Mean initial status, Θ_{30}	0.07	0.03	2.17	0.030 *
Random Effects	Variance		χ^2	
Child				
Initial status, b_{00}	1.16		5961.89	0.000 ***
Semester change rate, b_{10}	0.09		696.33	0.000 ***
Grade change rate, b_{20}	0.39		1767.06	0.000 ***
Semester × Grade change rate, b_{30}	0.12		548.91	0.011 *
Classroom				
Initial status, c_{00}	0.17		619.82	0.000 ***
Level-1 error, e	0.90			

Note. $N = 688$. †$p < .10$, *$p < .05$, ***$p < .001$.

Table 5.

Conditional Cross-classified Poisson Simplified Exclusion Growth Model

	Peer Exclusion			
Fixed Effects	Coefficient	*SE*	*t*	*p*
Initial status, π_0				
Mean initial status, Θ_{00}	-2.94	0.31	-9.51	0.000 ***
Child Demographic Variables				
Free Lunch Status, β_{01}	0.34	0.10	3.36	0.001 ***
Sex, β_{02}	0.13	0.09	1.43	0.154
Time-varying Covariate				
Classroom Emotional Climate, γ_{01}	0.00	0.06	-1.75	0.080 †
Semester change, π_1				
Mean initial status, Θ_{20}	0.19	0.21	0.91	0.361
Child Demographic Variables				
Free Lunch Status, β_{11}	-0.04	0.06	-0.69	0.489
Time-varying Covariate				
Classroom Emotional Climate, γ_{11}	-0.08	0.04	-2.08	0.038 *
Grade change, π_2				
Mean initial status, Θ_{10}	-0.54	0.06	-8.39	0.000 ***
Child Demographic Variables				
Free Lunch Status, β_{21}	-0.05	0.07	-0.67	0.505
Sex, β_{22}	0.14	0.06	2.22	0.026 *
Semester × Grade change, π_3				
Mean initial status, Θ_{30}	-0.08	0.04	-1.77	0.076 †
Child Demographic Variables				
Free Lunch Status, β_{31}	0.17	0.08	2.28	0.023 *
Random Effects	Variance		χ^2	
Child				
Initial status, b_{00}	0.95		4553.81	0.000 ***
Semester change rate, b_{10}	0.08		577.72	0.001 ***
Grade change rate, b_{20}	0.21		1234.59	0.000 ***
Semester × Grade change rate, b_{30}	0.14		556.24	0.006 **
Classroom				
Initial status, c_{00}	0.12		565.73	0.000 ***
Level-1 error, e	0.83			

Note. $N = 688$. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Table 6.

Unconditional Cross-classified Poisson Interactive Growth Model (with Exclusion Outcome and Anxious Solitude Predictor)

	Peer Exclusion			
Fixed effect	Coefficient	*SE*	*t*	*p*
Initial status, π_0				
Mean initial status, Θ_{00}	-3.50	0.05	-66.41	0.000 ***
Semester change, π_1				
Mean change rate, Θ_{10}	-0.18	0.04	-4.92	0.000 ***
Grade change, π_2				
Mean change rate, Θ_{20}	-0.45	0.05	-8.66	0.000 ***
Semester × Grade change, π_3				
Mean change rate, Θ_{30}	-0.05	0.04	-1.06	0.292
Anxious Solitude, π_4				
Mean change rate, Θ_{40}	3.68	0.21	17.16	0.000 ***
Anxious Solitude × Semester, π_5				
Mean change rate, Θ_{50}	-0.48	0.19	-2.46	0.014 *
Anxious Solitude × Grade, π_6				
Mean change rate, Θ_{60}	0.35	0.21	1.67	0.094 †
Anxious Solitude × Semester × Grade change π_7				
Mean change rate, Θ_{70}	-0.16	0.23	-0.69	0.489
Random effects	Variance		χ^2	
Child				
Initial status, b_{00}	0.71		3284.88	0.000 ***
Semester change rate, b_{10}	0.08		562.75	0.004 **
Grade change rate, b_{20}	0.17		1063.44	0.000 ***
Semester × Grade change rate, b_{30}	0.15		553.48	0.007 **
Classroom				
Initial status, c_{00}	0.10		475.90	0.000 ***
Level-1 error, e	0.80			

Note. $N = 688$. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Table 7.

Conditional Cross-classified Poisson Interactive Exclusion Growth Model
(with Exclusion Outcome and Anxious Solitude x Classroom Emotional Climate Interaction)

	Peer Exclusion			
Fixed Effects	Coefficient	*SE*	*t*	*p*
Initial status, π_0				
Mean initial status, Θ_{00}	-3.06	0.30	-10.12	0.000 ***
Child Demographic Variables				
Free Lunch Status, β_{01}	0.33	0.10	3.44	0.001 ***
Sex, β_{02}	0.11	0.07	1.63	0.104
Time-varying Covariate				
Classroom Emotional Climate, γ_{01}	-0.11	0.06	-2.06	0.039 *
Semester change, π_1				
Mean initial status, Θ_{10}	0.56	0.27	2.11	0.034 *
Child Demographic Variables				
Free Lunch Status, β_{11}	-0.01	0.08	-0.16	0.874
Sex, β_{12}	-0.12	0.06	-2.21	0.027 *
Time-varying Covariate				
Classroom Emotional Climate, γ_{11}	-0.13	0.05	-2.64	0.009 **
Grade change, π_2				
Mean initial status, Θ_{20}	-0.42	0.06	-7.31	0.000 ***
Child Demographic Variables				
Free Lunch Status, β_{21}	-0.07	0.08	-0.89	0.373
Semester × Grade change, π_3				
Mean initial status, Θ_{30}	-0.15	0.05	-2.77	0.006 **
Child Demographic Variables				
Free Lunch Status, β_{31}	0.30	0.10	3.08	0.003 **
Anxious Solitude, π_4				
Mean initial status, Θ_{40}	3.02	1.27	2.38	0.018 *
Child Demographic Variables				
Free Lunch Status, β_{41}	-0.47	0.46	-1.03	0.304
Time-varying Covariate				
Classroom Emotional Climate, γ_{41}	0.18	0.23	0.77	0.440
Anxious Solitude × Semester, π_5				
Mean initial status, Θ_{50}	-4.18	1.42	-2.95	0.004 **
Child Demographic Variables				
Free Lunch Status, β_{51}	0.20	0.43	0.46	0.646
Time-varying Covariate				
Classroom Emotional Climate, γ_{51}	0.69	0.27	2.62	0.009 **
Anxious Solitude × Grade Change, π_6				
Mean initial status, Θ_{60}	0.31	0.25	1.22	0.221
Child Demographic Variables				
Free Lunch Status, β_{61}	0.13	0.48	0.26	0.793
Anxious Solitude × Semester × Grade Change, π_7				
Mean initial status, Θ_{70}	0.39	0.28	1.37	0.17
Child Demographic Variables				
Free Lunch Status, β_{71}	-1.28	0.56	-2.31	0.021 *

Table 7 continued

Random Effects	Variance	χ^2	
Child			
Initial status, b_{00}	0.67	3213.38	0.000 ***
Semester change rate, b_{10}	0.08	566.57	0.002 **
Grade change rate, b_{20}	0.17	1067.71	0.000 ***
Semester × Grade change rate, b_{30}	0.15	563.07	0.003 **
Classroom			
Initial status, c_{00}	0.08	435.42	0.000 ***
Level-1 error, e	0.80		

Note. $N = 688$. *$p < .05$, **$p < .01$, ***$p < .001$.

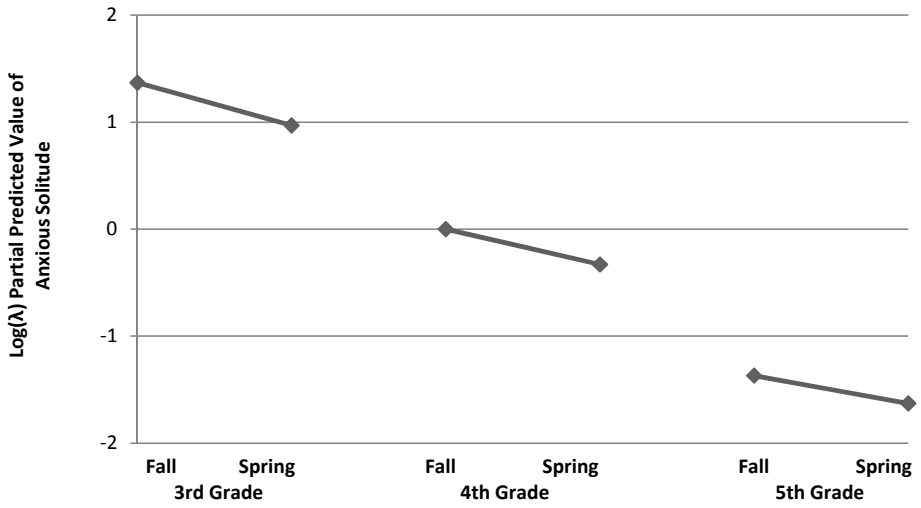

Figure 1.

Significant Semester × Grade interaction in the simplified anxious solitude model. There was a decrease in the predicted values of anxious solitude between the Fall and Spring semesters a cross all grades, and this decrease was most pronounced between the Fall and Spring semesters of third grade and less so in later grades.
This figure corresponds to Table 4.

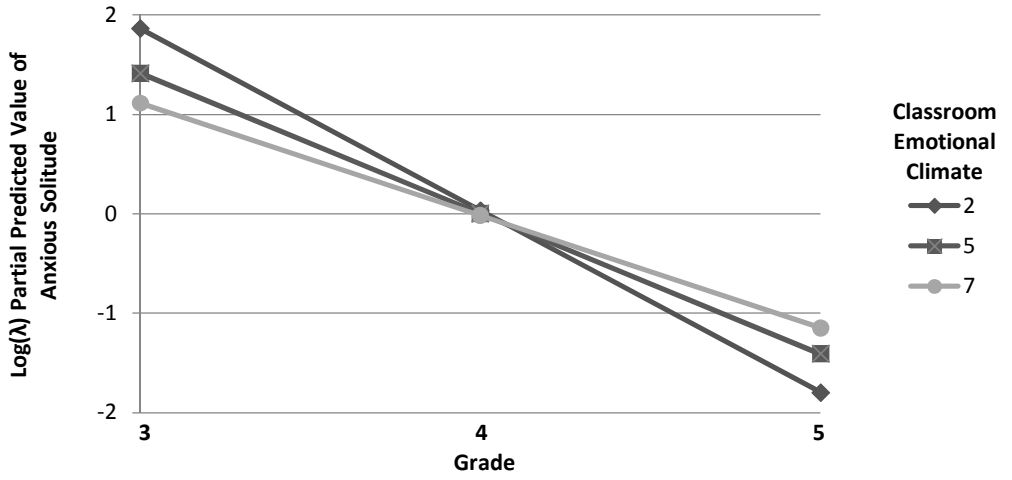

Figure 2.

Significant Classroom Emotional Climate × Grade interaction in the simplified anxious solitude model. In third grade, as quality of classroom emotional climate increased, predicted anxious solitude endorsement rates decreased. In fourth grade, there was no effect of classroom emotional climate on endorsement rates of anxious solitude. The pattern reversed in fifth grade, with predicted anxious solitude endorsement rates increasing as quality of classroom emotional climate increased. Note that a classroom emotional climate score of one is not presented in this figure (or in subsequent figures) because no classrooms scored less than two. This figure corresponds to Table 4.

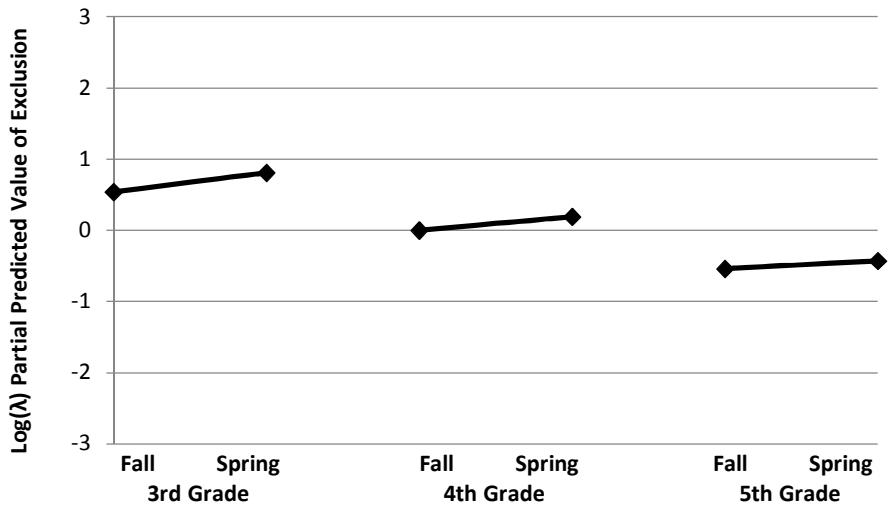

Figure 3.

Composite figure of simplified exclusion model changes across time. Patterns demonstrate a general decrease in endorsement rates of exclusion across grades, with a slight increase between Fall and Spring semesters of each grade. This figure corresponds to Table 5.

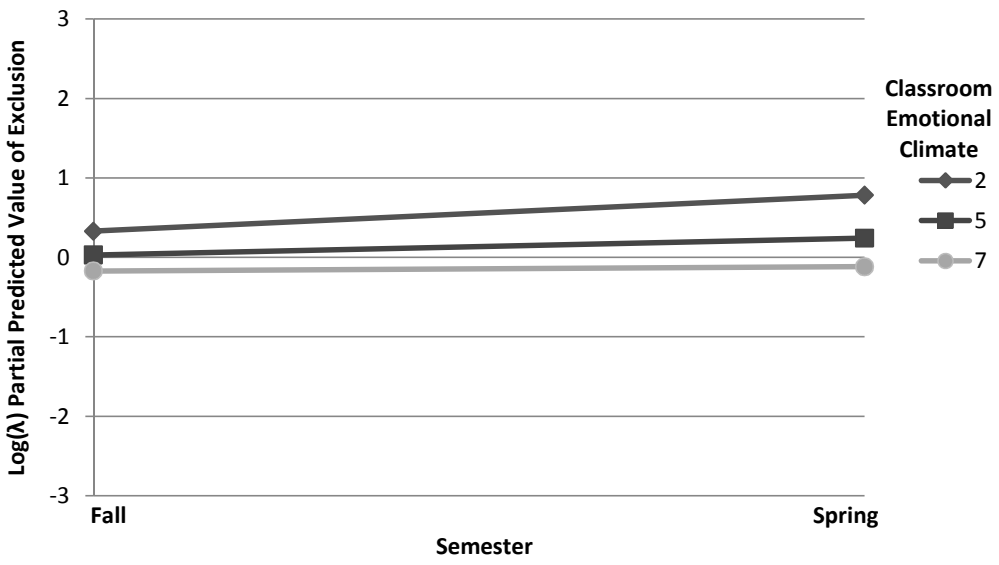

Figure 4.

Significant Classroom Emotional Climate × Semester interaction in the simplified exclusion model. For classrooms with low quality emotional climates, there were higher predicted values for exclusion overall; however, this difference was greater in Spring semesters than in Fall semesters. The rate of endorsement of exclusion decreased for both semesters as quality of classroom emotional climate increased. For classrooms with high quality emotional climates, endorsement rates of exclusion were nearly identical for Fall and Spring semesters. This figure corresponds to Table 5.

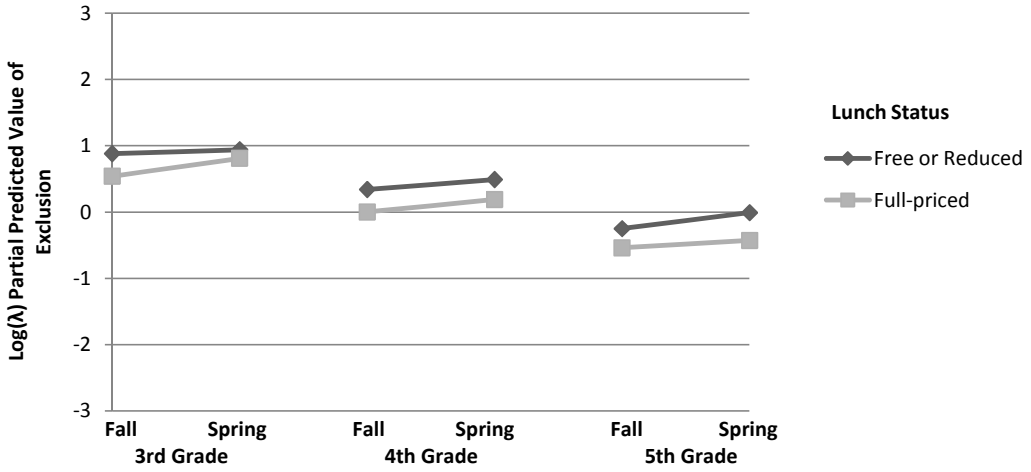

Figure 5.

Significant Free Lunch Status × Semester × Grade interaction in the simplified exclusion model. Students receiving free or reduced lunch versus others had consistently significantly higher predicted values of exclusion over time, and this pattern was more pronounced in the Spring semester than in the Fall semester, particularly in later grades. This figure corresponds to Table 5.

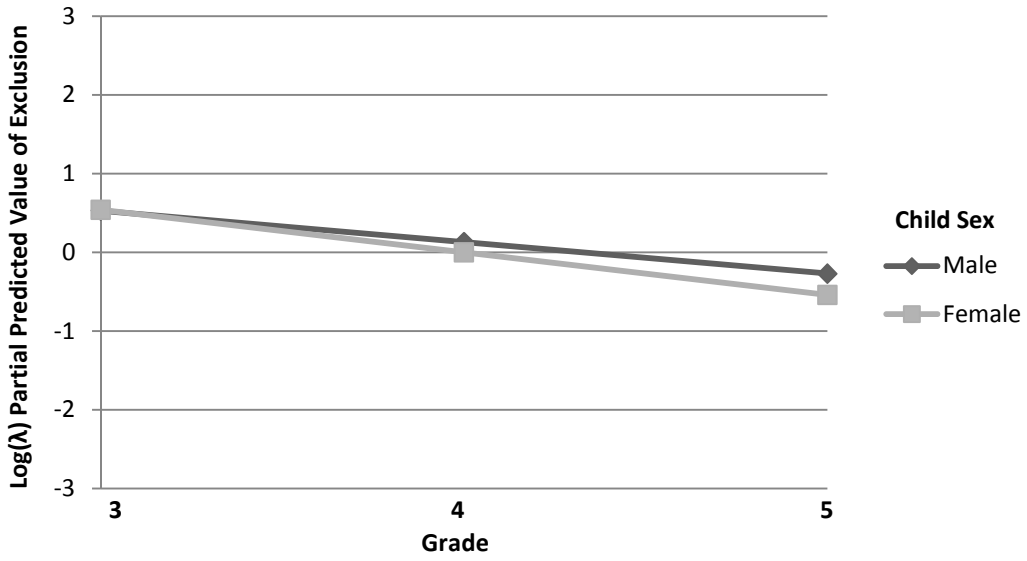

Figure 6.

Significant Child Sex × Grade interaction in the simplified exclusion model. Although boys and girls received similar endorsement rates for exclusion in third grade, there was a pattern for boys to receive an increasing endorsement rate for exclusion over time.
This figure corresponds to Table 5.

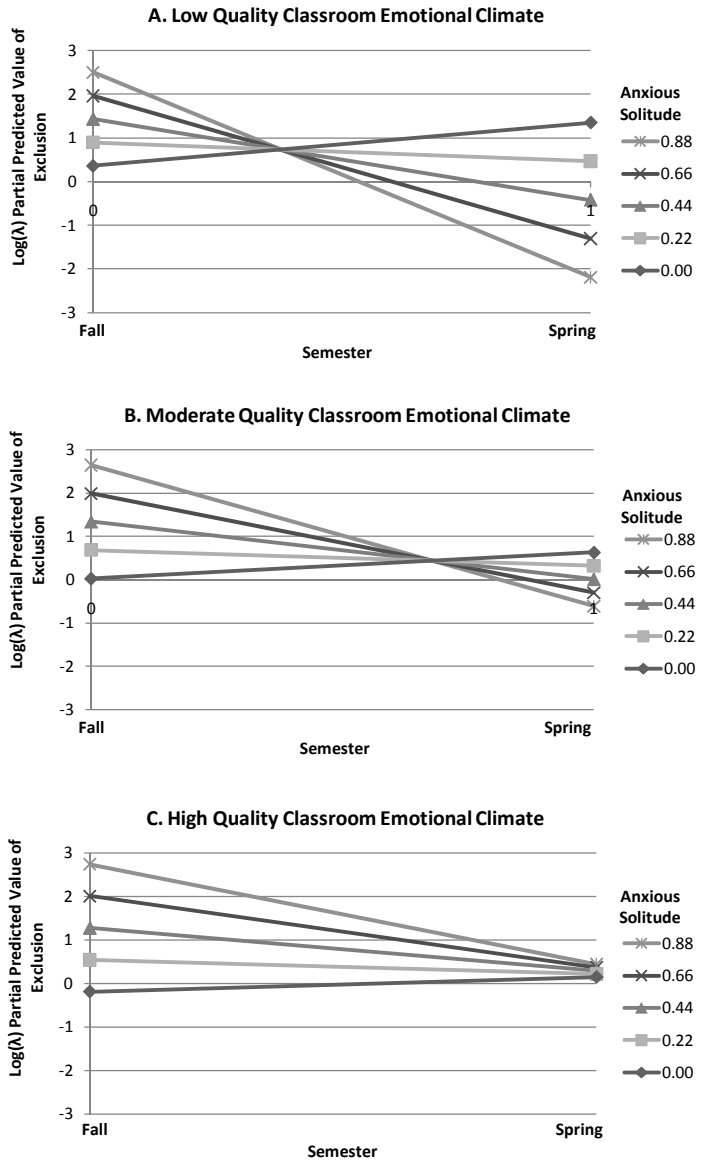

Figure 7.

Significant Anxious Solitude × Classroom Emotional Climate × Semester interaction in the interactive exclusion model. In Fall semesters, regardless of classroom emotional climate, as levels of anxious solitude increased, predicted values of exclusion also increased. However, in Spring semesters, results were dependent on quality of classroom emotional climate. Specifically, in low quality classrooms (see Panel A), an unexpected negative relation appeared such that children with higher levels of anxious solitude received lower endorsement rates of exclusion. Differences between Fall and Spring semesters was less pronounced in moderate quality classrooms (see Panel B). Furthermore, consistent with expectations, in high quality classrooms (See Panel C), differences in exclusion endorsement rates between children with different levels of anxious solitude disappeared by Spring semest This figure corresponds to Table 7.

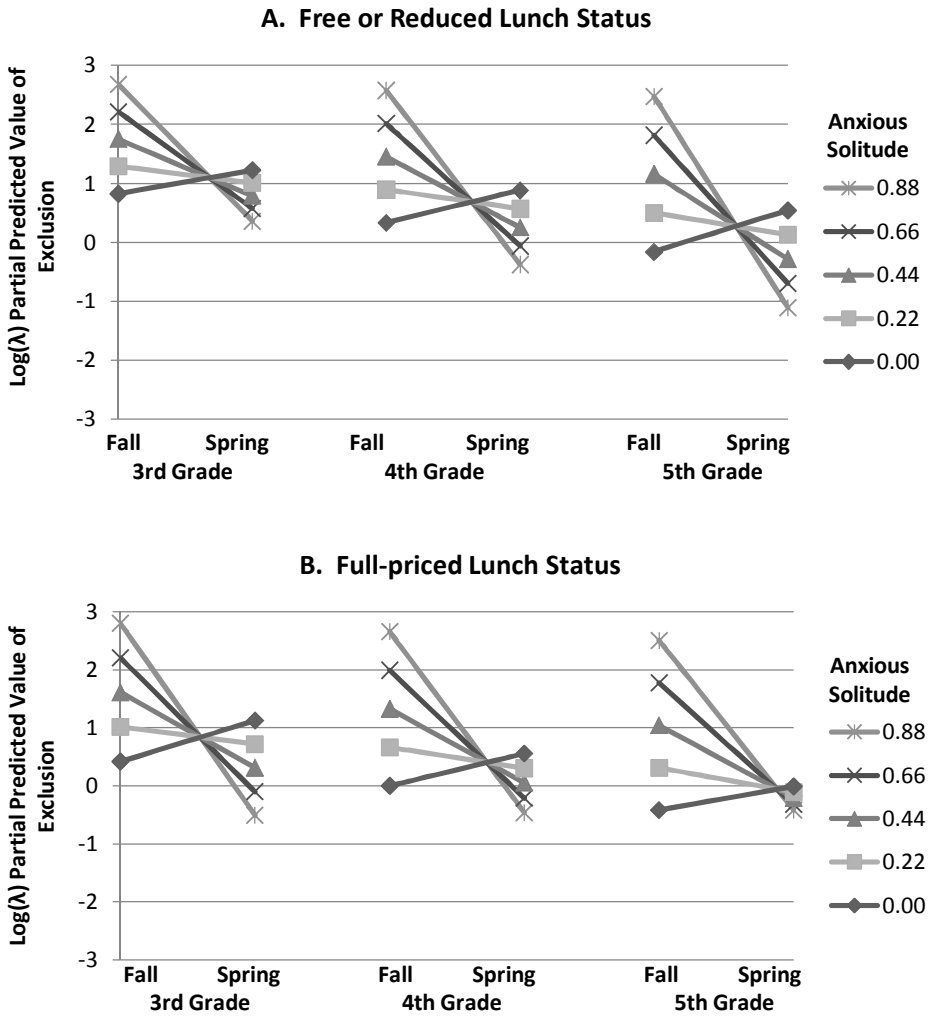

Figure 8.

Significant Anxious Solitude × Free Lunch Status × Semester × Grade interaction in the interactive exclusion model. Predicted values of exclusion were similar across grades and free lunch status for Fall semesters, with an increase in endorsement rates of exclusion as levels of anxious solitude increased. Children receiving free or reduced lunch versus others had higher initial endorsements rates of exclusion; however, this difference diminished at the highest levels of anxious solitude. Results differed in Spring semesters. There was an overall decrease in predicted values of exclusion as anxious solitude levels increased. Children receiving free or reduced lunch (see Panel A) received highest endorsement rates of exclusion in third grade and lowest levels in fifth grade. However, this decrease was less pronounced in third grade. For students who were not eligible for free or reduced lunch (see Panel B), there was also a general decrease in endorsement rates of exclusion across grades and across levels of anxious solitude. By the Spring semester of fifth grade, differences among anxious solitude levels were no longer present, with students receiving equal exclusion endorsement rates regardless of anxious solitude level. This figure corresponds to Table 7.

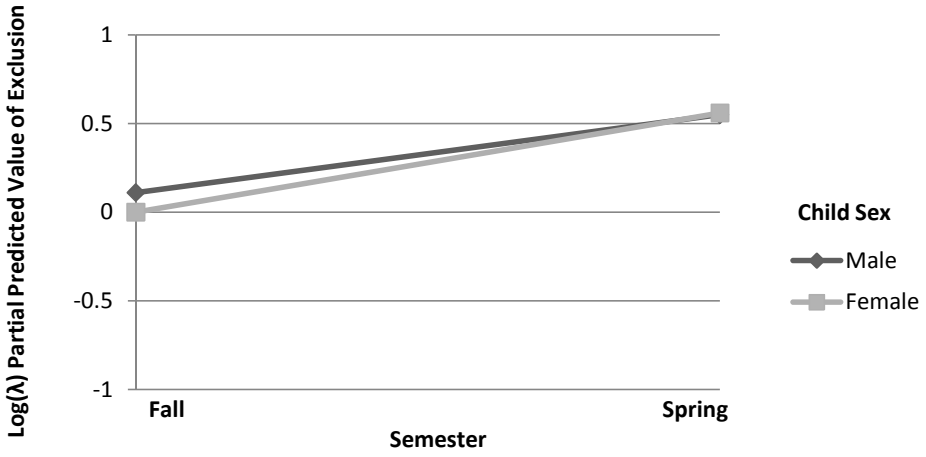

Figure 9.

Significant Child Sex × Semester interaction in the interactive exclusion model. There was no sex difference in the endorsement rates of exclusion in Spring semesters, but in Fall semesters, boys versus girls received a significantly higher endorsement rate of exclusion.
This figure corresponds to Table 7.